IPP

VOLUME III

PROJECT ALTERNATIVES, APPENDICES AND REFERENCES

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

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DRAFT ENVIRONMENTAL STATEMENT
INTERMOUNTAIN POWER PROJECT

US Department of the Interior
Bureau of Land Management

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VOLUME III ALTERNATIVES TO THE INTERMOUNTAIN POWER PROJECT, SUMMARY, APPENDICES, AND REFERENCES

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U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

INTRODUCTION

This volume brings together the analysis and description of those items which pertain to the Intermountain Power Project (IPP) at either of the sites at which it might be built. The first section summarizes and compares the unavoidabble adverse impacts of the Salt Wash proposal with those of the Lynndyl alternative. The impacts of transmission line routes common to both the Salt Wash proposal and Lynndyl altenative are included in both discussions in order to present a complete comparison. The second section examines alternatives to IPP itself--including no action. The third section is Chapter 9 and describes the consultation and coordination which has aided the preparation of the statement.

The last portion of this volume contains the Appendixes, Glossary, and References Cited.

TABLE OF CONTENTS

SUMMARY

Salt Wash Site

Air Quality

The discharge of pollutants into the atmosphere would be an unavoidable impact. IPP's emissions would be: 1) SO_2 - 44.2 tons per day, 2) Particulates - 5.6 tons per day, and 3) NO_2 - 251.4 tons per day,

All emission standards would be met, and all air quality standards, with the exception of the Prevention of Significant Deterioration (PSD) increments, would be met. The Class II annual and 24-hour SO_2 PSD increments, surrounding the primary plant site would be exceeded. The Class I SO_2 PSD increments would be exceeded in Capitol Reef National Park, Canyonlands National Park, and Glen Canyon National Recreation Area (all in Utah). Short-term (3-hour and 24-hour) Class I Standards in Capitol Reef National Park would be exceeded 34 days each year, above the 5 percent variance permitted by the Clean Air Act Amendments of 1977.

Calculations show that:

1. Within Capitol Reef National Park itself, the visual range would be reduced from 87 miles to between 80 and 84 miles for 7 to 11 days each year. For the remainder of the year, the reduction in visibility would be less than 3 miles out of 87 miles.

2. The visual range of an observer standing in Capitol Reef National Park and looking eastwardly toward the IPP plant would be reduced from 87 miles to between 75 and 83 miles for about 6 months of the year, depending upon observer location relative to the plume.

3. The current visual range in and near the park, based on data gather in 1975 through 1976, is approximately 40 miles or less for about 20 percent of the time (due mostly to blowing dust). Under these conditions, power plant emissions could further reduce the visibility to between 34 and 39, miles both within the park boundaries and for an observer standing in the park looking toward an object outside the park boundaries.

As a result of NO_2 emissions, a discoloration of the atmosphere could be expected.

The determination of the significance of the impacts to visibility in Class I areas would depend upon the regulations that are to be promulgated by EPA sometime after August 7, 1979 and the position of the federal land manager charged with the direct responsibility for management of the affected Class I area. It is the present policy of the National Park Service to protect the scenic values of their Class I areas from any visual impairment at human levels of perception (memo from Director, NPS, to Mr. David Hawkins, EPA, April 5, 1978).

Air Quality

The discharge of pollutants into the atmosphere would be an unavoidable impact. IPP's emissions would be:

1. SO_2 - 55.6 tons per day,
2. Particulates - 7.1 tons per day, and
3. NO_2 - 251.4 tons per day.

All emission standards would be met, as would all state and federal air quality standards. No significant visibility reductions are calculated to occur at any existing or potential Class I region as a result of emissions from the IPP power plant at the Lynndyl site. However, depending upon meteorological conditions and plume observer position, a discoloration of the atmosphere could be expected in the Sevier Desert due to the IPP plume.

Salt Wash Site

Topography and Paleontology

Topography on 200 acres would be altered by removal of 7.6 million cubic yards of borrow materials.

The Morrison Formation, in which most North American dinosaurs have been found, would be adversely affected by increased recreational use and rockhounding in the region. The power transmission systems would cross 41 miles of geologic formations with potential for high paleontological significance. An unquantifiable loss of scientific-educational information would result.

Soils

Increased off-road vehicle (ORV) travel in the regional setting would disturb vegetation on high wind erosion hazard soils northeast of Hanksville. Construction activities would cause localized erosion on approxmately 5,710 acres within the project area. Approximately 500 miles of moderate to high wind erosion hazard soils would be crossed by the power transmission systems. Increased erosion would be localized on the disturbed areas and no impacts on other resources are expected. Severe erosion and slumping could occur along 4 miles of power transmission system in the Fishlake National Forest in Utah.

Water Resources

Approximately 2 percent (30,000 acre-feet) of Utah's share of Colorado River water would be committed to IPP. Withdrawal of the water from the Fremont River would increase the salinity of the Colorado River at Lee's Ferry by, at most, 0.6 milligrams per liter. This would be an increase of less than 1/10 of 1 percent. The natural flow of 24 springs and seeps and four wells could be stopped for over 50 years beyond the life of the project. The quality of the ground water in the Navajo Sandstone aquifer would decrease with pumping by IPP.

Topography, and Paleontology

Topography on 200 acres would be altered by the removal of 1.2 million cubic yards of borrow materials. Paleozoic (600-225 million year-old) formations containing trilobites and other invertebrate fossils would be adversely affected by the increased population recreating within the region. The power transmission systems would cross 23 miles of geologic formations having potential for high paleontological significance. An unquantifiable amount of scientific and educational information could be lost.

Soils

An increase in off-road vehicle (ORV) travel would disturb vegetation on soils having a high potential for wind erosion.

Construction activities in the primary project area would disturb 2,600 acres of soils.

Erosion along power transmission systems would increase as vegetation that serves to stabilize soils would be removed or crushed by construction equipment. The potential for increased erosion would be greatest on 400 miles of high erosion hazard soils that would be affected by the transmssion line systems.

Erosion would be localized on the disturbed areas, and no impacts on other resources would be expected.

Water Resources

Loss of seepage from the Central Utah Canal could result in the loss of discharge of 650 acre-feet per year at Clear Lake Springs, 1,700 acre-feet at seeps west of Greenwood, and 750 acre-feet at Mud Lake Springs. This would represent a 4 percent reduction of flow at Clear Lake Springs and an unknown reduction at the remaining springs and seeps. Seepage in the Delta-Melville-Abraham-Deseret (DMAD) service area, conveyed to the extensive open drain system and then to the surrounding wetlands and playas, would be approximately 2,100 acre-feet per year, a 9 percent decrease from present levels.

Assuming increased pumping of the eight DMAD wells, 13,900 acre-feet each year above present average levels, there would be a slight acceleration of the present trend of declining water quality. Under IPP project conditions, water of 1,000 parts per million dissolved solids may reach the Delta area in 90 to 140 years.

Pumping a maximum of 5,500 acre-feet of water per year in the project area would create a new cone of depression in the immediate vicinity of the wells and may alter ground water hydraulic gradients, which would cause a slight shift in ground water movement.

Vegetation

Approximately 11,890 acres of vegetation ranging from alpine forest to hot desert and Joshua tree forest would be disturbed. The majority of the disturbance would be in the cold desert type. About 5,650 acres of those disturbed would remain occupied by project components. Up to 240 acres of riparian vegetation could be adversely altered due to diversion of water from the Fremont River and stopping of natural flow at springs and seeps.

Even with federally required measures, individual plants of threatened or endangered species could be inadvertantly destroyed. It is not likely that the continued existence of any candidate, proposed, or officially listed threatened or endangered plant species would be jeopardized by the construction and operation of IPP at the Salt Wash Site.

Animal Life

Overall, the project would disturb about 11,890 acres of wildlife habitat of which 5,650 acres would remain occupied at least during the life of the project. This would affect only a minute portion of the total animal habitat and populations.

The additional people that the proposed project would bring to Wayne County, Utah would increase the hunting pressure on and poaching and harassment of the region's game and non-game species including the endangered Utah prairie dog, bald eagle, peregrine falcon, and black-footed ferret, and could reduce animal life populations. The presence of 60 miles of new permanent access roads would further intensify this pressure. The degree of decline cannot be accurately predicted. Incidental losses are not expected to adversely modify the critical habitat of threatened or endangered species. The impact on the populations of prairie dogs and eagles would not be severe enough to jeopardize their continued existence. However, only five active peregrine eyries are known to exist in Utah, thus unnecessary loss of even one pergrine could constitute jeopardy to the Utah population (John Gill, FWS).

Up to 240 acres of riparian habitat important to deer, quail, ring-neck pheasant and non-game animals would be adversely altered by surface water diversion and ground water pumping. Up to 434 acres of agricultural land important to ring neck pheasant could be occupied by residential developments. Twenty-five pheasants and their annual production could be lost. This is 100 percent of the population in the affected area. Ground water pumping would stop natural flow of as many as 24 springs and seeps which are water sources for up to 147,200 acres of wildlife habitat in a desert region.

Transmission system towers along 47 miles in sage grouse concentration areas would provide perches for raptors and make the sage grouse more susceptible to predation. The magnitude of losses cannot be accurately assessed.

An additional 31,000 game fish per year would be needed within the region to supply the equivalent of the 1973 quality of fishing to the IPP-related population. The Utah Division of Wildlife Resource fish hatcheries are presently operating at their capacity of 11 to 12 million trout per year, and rainbow, cutthroat, brook and lake trout populations could decline without supplemental planting. In addition, the average age and size of fish in the waters of the region would decline.

Some incidental losses of the endangered Colorado squawfish and humpback chub, the proposed endangered bonytail chub, and the proposed threatened humpback sucker in the Green River could occur as a result of increased fishing pressure. These incidental losses would not jeopardize the continued existence of these species or adversely modify their critical habitat.

Vegetation

Vegetation on 8,320 surface acres would be temporarily disturbed during construction, and 2,650 acres would be occupied for the life of the project. Wetland vegetation would be influenced by an estimated 9 percent reduction in surface water, abandonment of Fool Creek Reservoirs and of about 50 miles of the Central Utah Canal.

Even with federally required measures, it is possible that some individual threatened or endangered plants could be inadvertently destroyed. It is not likely that the continued existence of any candidate proposed or officially listed species would be jeopardized.

Animal Life

Overall, the project would disturb about 8,320 acres of wildlife habitat, of which 2,650 acres would remain occupied at least for the life of the project. This would affect only a minute portion of the total habitat and populations in the affected areas.

The additional people that the project would bring to central Utah would increase the hunting pressure on and poaching and harassment of the region's game and non-game species, including the endangered peregrine falcon and bald eagle, and could reduce animal life populations. This situation would be intensified by increased travel encouraged by approximately 47 miles of new permanent access roads. The degree of decline cannot be accurately predicted.

Incidental losses are not expected to adversely modify the critical habitat of threatened or endangered species. The impact on the population of eagles would not be severe enough to jeopardize their continued existence. However, only five active peregrine eyries are known to exist in Utah, thus unnecessary loss of even one peregrine could constitute jeopardy to the Utah population (John Gill, FWS).

A 9 percent reduction in waterflows to bottomlands in Millard County would reduce the numbers of resident waterfowl and other marsh-associated birds. Migratory waterfowl would also be affected. Abandonment of the Fool Creek Reservoirs would displace in excess of 2,000 migrant waterfowl and an unknown number of resident waterfowl and marsh-associated birds.

Retirement of 7,250 to 7,760 acres of irrigated farmland in eastern Millard County would reduce food and cover for ring-neck pheasant. Approximately 1,300 breeding males, 5,200 breeding females, and their annual production of 24,200 young pheasants could be lost if abandoned farmlands were fully grazed by domestic livestock or if vegetative cover was removed by other means. This would represent a loss of approximately 8 percent of the pheasants in Millard County.

Transmission system towers along 20 miles of sage grouse concentration areas would provide perches for raptors and make sage grouse more susceptible to predation. The magnitude of losses cannot be accurately assessed. If construction continued during the raptor nesting season, nest abandonment and a decrease in hawk production would likely result.

An additional 22,000 game fish per year would be needed within the region to supply the equivalent of the 1973 quality of fishing to the IPP-related population. The Utah Division of Wildlife Resource fish hatcheries are presently operating at their capacity of 11 to 12 million fish per year and rainbow, brook, lake, and cutthroat trout numbers in the region's lakes and streams could decline without supplemental planting. In addition, the average age and size of fish in these waters would decrease through increased harvest.

Cultural Resources

Vandalism to the cultural values known to exist in the regional setting would result from the increased numbers of people associated with the proposed project. Several hundred known archaeological sites have been recorded in the area, of which 45 are eligible for inclusion in the National Register of Historic Places. The amount and significance of loss cannot be accurately predicted.

Inadvertent damage could also occur to subsurface values not initially discovered through field inventories; 479 known sites (of which 88 appear to meet National Register eligibility criteria) could be affected within the primary project area and along the proposed transmission system routes.

One segment of the proposed transmission line system would be visible from the Caliente Railroad Depot, Lincoln County, Nevada, an historic site currently (April, 1979) listed on the National Register of Historic Places. The introduction of visual elements out of character with the site would detract from its historic setting.

Wherever possible and feasible, cultural resources would be avoided by construction and related activities. If this is not possible, the BLM would consult with the appropriate State Historic Preservation Officer to determine the most satisfactory means of mitigating damage. Even with present salvage techniques, some scientific and educational information could be lost.

Cultural Resources

Vandalism to the cultural values known to exist in the regional setting would result from the increased numbers of people associated with the project. Several hundred sites have been recorded in this area, of which 24 are listed in the National Register of Historic Places. Inadvertent damage could occur to surface and subsurface values not initially discovered through field inventories; 274 known sites (of which 82 appear to meet National Register eligibility criteria) could be affected within the primary project area and along the transmission system routes.

Three segments of the preferred transmission line system would be visible from the following historic sites currently (April 1979) listed on the National Register of Historic Places:

Old Irontown, Iron County, Utah;
Mountain Meadows Historic Site, Washington County, Utah;
Caliente Railroad Depot, Lincoln County, Nevada; and
Bristol Wells Town Site, Lincoln County, Nevada.

The introduction of visual elements out of character with these sites would detract from their historic setting.

Wherever possible and feasible, cultural resources would be avoided by construction and related activities. If this is not possible, the BLM would consult with the appropriate State Historic Preservation Officer to determine the most satisfactory means of mitigating damage. Even with present salvage techniques, some scientific and educational information could be lost.

Salt Wash Site

Recreation and Aesthetics

Off-road vehicle use and other forms of outdoor recreational use would increase within the region. Additional recreational pressures would most often occur at sites presently being used at greater than 20 percent of their design capacity, increasing use to 40 percent or more at many of the sites, which would result in overcrowding and deterioration of the environment and facilities. Overcrowding and deterioration would be intensified at sites presently being used at greater than 40 percent capacity.

The appeal of recreation attraction areas within the regional setting would be reduced for some visitors. The increase in permanent population would result in additional competition for available fish and game, which would lead to reduced hunter and fisherman success and could result in some dissatisfaction with the recreation experience.

The power plant and its visible emissions would be obvious to travelers on some segments of Highway U-24 and to viewers in areas of Class A scenery on the Fishlake National Forest, Capitol Reef National Park, and the BLM proposed Hondu Primitive Area. Atmospheric discoloration and reduction of visual range would degrade scenic value of high quality scenic areas in the region.

The transmission system would make 36 major highway crossings, and would parallel major highways I-15 and U.S. 93 for 160 miles in Utah and Nevada where it would be visible (medium to high contrast) to travelers in 15,145 vehicles daily. One proposed line would parallel U.S. 93 for 45 miles and would create a "tunnel effect" in combination with an existing line on the opposite side of the highway. The lines would be visible (medium to high contrast) from several communities in Utah, Henderson, Nevada (low contrast), and Apple Valley, California (medium contrast); portions of 25 recreation attractions or areas of high scenic quality; and portions of 40 areas with potential for wilderness designation (low to high contrast).

The coal haul railroad would be a visual intrusion on the proposed Hondu Primitive Area and the Interstate Highway 70 (I-70) corridor. Along I-70 the resulting high contrast would be visible to passengers in 1,300 vehicles daily.

The presence of the proposed Moroni microwave station would reduce high aesthetic values in the area surrounding the station.

Recreation and Aesthetics

Off-road vehicle use and other forms of outdoor recreational use would increase within the region. Additional recreational pressures would most often occur at sites presently being used at greater than 20 percent of their design capacity, increasing use to 40 percent or more at many of the sites, which would result in overcrowding and deterioration of the environment and facilities. Overcrowding and deterioration would be intensified at sites presently being used at greater than 40 percent capacity.

The appeal of recreation areas within the Sevier Desert would be reduced for some visitors. The increase in permanent population would result in additional competition for available fish and game and would likely lead to less hunter and fisherman success and a resulting dissatisfaction with the recreation experience.

The powerplant stacks, buildings, and emissions would be visible (high contrast) from U.S. Highway 50. The plant would be seen (low to high contrast) from other surrounding highways, communities, and recreation attraction areas as far as 40 miles distant. It would be considered a landmark of interest to some and an aesthetically degrading intrusion to others. The transmission lines would cause visually adverse manmade contrast in or near sensitive areas such as major travel routes, primary highway crossings, high-quality scenic areas, communities, or in areas with recreational values.

Where proposed transmission lines would parallel existing lines, additional contrast would generally not add appreciably to present contrast, but would make disturbance more obvious. The power transmission systems would make 42 highway crossings in areas of low-quality scenery that would be viewed by 121,545 passengers in vehicles daily. In all areas aesthetics values would be somewhat reduced (medium contrast) although the areas have already been disturbed. The lines would be visible from several communities in Utah (medium to high contrast); Henderson, Nevada (low contrast); and Apple Valley, California (medium contrast). The transmission systems would be visible (low to high contrast) from 26 adjacent recreation attractions or areas of high quality (Class A) scenery and from portions of 35 areas with potential for wilderness designation (low to high contrast).

Salt Wash Site

Land Use

Up to 434 acres (37 percent) of the irrigated land east of Capitol Reef National Park in Wayne County could be subdivided into small non-agricultural developments. An additional 133 acres (less than 0.05 percent) of agricultural land in Emery County would be occupied by the proposed railroad.

In the regional setting, two RARE II Final Environmental Statement Wilderness Recommendation areas, four National Park Service Wilderness proposals, and an undetermined number of BLM uninventoried roadless areas, including nine areas identified as having potential for special designation, may receive additional ORV and other visitor use, resulting in degradation of wilderness value.

Should the proposed Moroni microwave station be built, primitive values within a portion of the proposed Hondu Primitive Area would be lost.

The proposed coal haul railroad route would pass through four uninventoried BLM Roadless Units, and would impair any wilderness character and designation suitability adjacent to the route. Any impairment of wilderness suitability would not be allowed prior to completion of the wilderness review and congressional decision on areas having wilderness character. No alternatives to avoid wilderness impacts have been identified.

No adverse impacts on mining or other mineral resource extraction operations have been identified.

The proposed Salt Wash Transmission System would pass through the following 14 areas with potential for wilderness designation: five BLM Wilderness Study Areas (WSAs), and nine uninventoried BLM Roadless Units. Construction of transmission lines would impair wilderness character and designation suitability in the WSAs. Designation suitability of roadless units could be impaired adjacent to the line. Any impairment of wilderness suitability on areas having wilderness character would not be allowed prior to completion of the wilderness review and congressional decision. Alternate routing would avoid impacts to wilderness character in WSAs except possibly in the case of WSA NV-050-IPP-07, Delamar Mountain.

Land Use Plans and Controls

The proposed railroad would cross I-70, conflicting with visual resource management objectives recommended in the BLM San Rafael Resource Area MFP. Proposed powerline activities would be in conflict with current BLM management objectives in nine areas.

The BLM planning system allows for consideration of new proposals. Alernatives are presented in this environmental statement which would avoid conflicts for some planning units; however, other plans would require revision in order for the conflicts to be resolved. Any revisions would be made following agency regulations, procedures, and policies. For BLM (inasmuch as new planning regulations have not been finalized) a policy would be followed wich would utilize the environmental statment process as a mechanism for considerng planning recommendations and trade-offs. An approval of the proposal and/or alternatives analyzed in the environmental statement shall also be a decision to amend the plans.

Land Use

An annual maximum of 44,700 acre-feet of irrigation water would be transferred from agricultural use to industrial use and would remove up to 7,760 acres of agricultural land from production. As compared to 1977 Utah harvest figures, crop losses would be equivalent to 1 percent of the alfalfa, 51 percent of the alfalfa seed, 3 percent of the grain, and 2 percent of the corn and potato production in Utah.

No adverse impacts on mining or other mineral resource extraction operations have been identified.

The Lynndyl Transmission System would pass within the following four areas with potential for wilderness designation: three BLM Wilderness Study Areas (WSAs) and one uninventoried BLM Roadless Unit. Construction of transmission lines within these areas would impair designation suitability of the WSAs and the Roadless Unit adjacent to the line. Any impairment of wilderness suitability would not be allowed prior to completion of the wilderness review and congressional decision on areas having wilderness character. Alternative routes would avoid WSA and Roadless Unit impacts, except possibly in the case of WSA NV-050-IPP-07, Delamar Mountain.

Land Use Plans and Controls

The power generating station and support facilities are not compatible with Millard County's Zoning Ordinance Number 78. The area's current designation is Open Range and Forest (RF-1), and a zoning variance would be required for plant construction. The transmission routes conflict with BLM management objectives in five areas and one USFS land use plan.

Both Forest Service and BLM planning systems allow for consideration of new proposals. Alternatives are presented in this environmental statement which would avoid conflicts for some planning units; however, other plans would require revision in order for the conflicts to be resolved. Any revisions would be made following agency regulations, procedures, and policies. For BLM (inasmuch as new planning regulations have not been finalized) a policy would be followed which would utilize the environmental statement process as a mechanism for considering planning recommendations and trade-offs. An approval of the proposal and/or alternatives analyzed in the environmental statement shall also be a decision to amend the plans.

Salt Wash Site

Human Resources

Population

The 1987, peak Wayne County population is estimated to reach 10,800, of which 83 percent would result from the construction phase of IPP. IPP's operational phase (from 1990 on) would add a total of 3,170 permanent residents to Wayne County (63 percent of the total population).

Employment

At the peak of the construction period in 1986, IPP would increase total employment in Wayne County by 4,963 jobs (95 percent). The 1990 project-related direct and secondary employment would be 90 percent of the total employment for the county.

Utilities

A water treatment plant and distribution system, delivering at least 2.24 million gallons per day (MGD), would be required, as well as a sewage treatment plant and sewer lines with a capacity of 0.94 MGD. All solid-waste disposal facilities in Wayne County are open dumps. Either present sites would have to be converted to sanitary land-fills, or space acquired for new facilities. The need for these changes will occur regardless of the demand on solid waste facilities created by IPP.

Infrastructure

The present Wayne County schools' capacity would be exceeded by 1,762 students in 1987. One hundred percent of those students would be attributable to IPP. There would be a need for construction of at least two new schools, one elementary and one junior-senior high school, or for expansion of the present junior-senior high school.

The IPP-related population is expected to create a need for a maximum of ten additional law enforcement officers, a police station, and five police cars. An additional fire station with three pumper trucks, two other vehicles, and about 15 to 20 volunteer firemen would also be required.

Public Health and Professional Personnel

At least two doctors, two dentists, seven to ten nurses, and one small hospital would be needed.

Human Resources

Population

The 1987 peak population is estimated to reach 15,440, 32 percent of which would result from IPP. IPP's operational phase (from 1990 on) would add a total of 2,250 permanent residents to Millard and Juab counties (10 percent of the total population).

Employment

At the peak of the construction period in 1986, IPP would increase total employment in Millard and Juab counties by 3,335 jobs (38 percent). The 1990 project-related direct and secondary employment would be 14 percent of the total employment for the two counties.

IPP also would bring about shifts in the distribution of Millard County employment. Higher-paying construction employment would temporarily be Millard County's largest employment sector.

Utilities

It is estimated that IPP-related population growth would require water for 830 dwellings and an additional 1.32 million gallons of culinary water storage capacity in the Delta-Lynndyl area by 1986. Waste-water treatment capacity would need to be expanded by 44 percent in the Delta-Lynndyl area and by 75 percent in the Eureka area to service peak-year population. Nephi and Fillmore area municipalities could absorb the anticipated growth.

All solid-waste disposal facilities in Millard and Juab counties are open dumps; either present sites would have to be converted to sanitary landfills, or space acquired for new facilities. The need for these changes will occur regardless of the demand on solid waste facilities created by IPP.

Infrastructure

IPP would add to a crowding problem in the schools that will already exist by 1982. The present schools' capacity would be exceeded by 1,255 students in 1987; 100 percent of those students would be attributable to IPP. Fifty-six new teachers would be needed to maintain present student-teacher ratios.

In the Delta-Lynndyl area, IPP-related population is expected to create a need for a maximum of eight additional law enforcement officers during the peak construction period, but only three additional officers during the post-1990 operation phase of the project. A maximum project-related need for one additional officer would be anticipated in the Nephi and Fillmore areas. The Delta-Lynndyl area would need an additional fire pumper rated at 500 gallons per minute (g.p.m.), and the Nephi area would need an additional 250 g.p.m. pumper to continue to meet pumping capacity standards.

Public Health and Professional Personnel

West Millard Hospital would be near capacity at the year of IPP's peak construction. However, some of the 18 existing long-term care beds could be used to meet the temporary peak demand. The Nephi area's Juab County Hospital

Housing

At peak population (1987), approximately 2,491 additional permanent and temporary housing units would be needed to serve the IPP-related population. The permanent IPP-related population would demand only 826 additional housing units, or 1,565 fewer units than required at the peak of construction. The difference between the demand for single-family homes at the population peak and the operation and maintenance phase would be filled by group quarters for single workers or by mobile homes.

Local Government and Finance

The increases in population, housing, and economic activity in the Wayne County area would affect local government administration. These effects would be translated into a need for additional personnel, materials, supplies, and space. Present local governmental operations and procedures would be subjected to stress, especially during peak IPP construction. A front-end financing problem (insufficient funds to cover costs of service provision in the early years of project construction) would result from the unresponsive property tax system.

and the Fillmore Hospital would be able to absorb the peak year demand without exceeding the optimal capacities of the present facilities.

The Delta-Lynndyl area is the only area which would require additional medical personnel. The peak-year requirements attributable to IPP would be two physicians, three registered nurses, one licensed practical nurse, and one mental health worker in addition to the present number in the area. IPP-related permanent population from 1990 through the plant's operation phase would require one physician, one registered nurse, and one mental health worker to maintain current personnel-to-population ratios for rural areas of Utah.

Housing

At peak housing demand, approximately 2,210 housing units would be needed to serve the IPP-related population. Of these units, 460 would be permanent and the remaining 1,750 would be temporary units such as campers, trailers, and man-camp units which would be removed as they become surplus.

The permanent IPP-related population would demand only 460 permanent and 140 temporary housing units, or 180 fewer permanent units than demanded at the peak of construction. If all permanent housing required for workers at peak construction was built, 30 percent of the permanent units would become vacant excess housing between 1988 (when construction activity declines) and 1993 (when projected non-IPP related population growth would reach levels sufficient to utilize the excess units).

Local Government and Finance

Local Government

The increases in population, housing, and economic activity in the impact area would affect local government administration, especially in Millard County and the cities and towns in the Delta-Lynndyl area. These effects would be translated into a need for additional personnel, materials, supplies, and space. Present local governmental operations and procedures would be subjected to stress, especially during peak IPP construction. The most pressing needs would probably be personnel and space. It is anticipated that the City of Delta and Millard County would have to hire two additional full-time persons for each jurisdiction.

Net Effects of Costs and Revenues

The taxes from the IPP plant itself would be primarily responsible for the Millard County surplus of $5.1 million in 1990. IPP would cause deficits in Juab County ranging from $4,400 to $16,900.

Note: The impacts on Human Resources (Quality of Life, Coal Source Area, and Human Health and Safety) would be essentially the same as described for the Salt Wash site.

Quality of Life

Quality of life impact projections are made on the basis of what has occurred in other sparsely populated, culturally homogeneous rural areas that have experienced rapid population growth because of energy development projects. The new jobs that would be made available by the proposed project, as well as the increased indirect employment opportunities, would make it possible for many local residents to remain in or return to the area. Increased employment and income opportunities associated with the proposed project would improve the quality and variety of important local services.

On the opposite side, however, rapid energy-related growth would be typically accompanied by inflation and higher prices. Many older residents of the area, who must live on fixed incomes, would be unable to benefit from the higher wages and would experience the most negative impacts to quality of life.

The construction phase of the project would result in a more heterogeneous area population. Other communities in Utah have also experienced problems concurrent with rapid population growth. Crime has increased at a rate that is significantly higher than the increase in local population. (However, delinquency rates--often an excellent barometer of problems in a community--have not increased as rapidly as has the population.) Increased mental health problems have been noted by the area comprehensive mental health clinics, and increased drinking problems are reflected in increased arrest rates, more fights and disturbances, and high absenteeism from work.

Thus it is anticipated that increased crime rates, suicide, divorce, and personal problems would be experienced as a result of population growth and diversification. Many of these increases would be a function of the importation of a more susceptible population than a direct function of growth. For example, divorce rates in energy boomtowns usually go up--often a result of the fact that newcomers are usually younger, have fewer children, and are more likely to come from different religious backgrounds.

Coal Source Area-Socioeconomics

The coal source, Carbon and Emery Counties, would see a population increase of at least 10,000 people. Population projections, however, have become a matter of disagreement between state and local government; therefore, quantification of impacts under this section has not been attempted. Unlike the population associated with the plant site, the coal-related population would grow gradually to a stable level. This increased population, however, would be added to an area already stressed by rapid population growth.

Income in the coal source impact area would increase but would not be evenly distributed among the population. People with low or fixed incomes would be relatively worse off as higher incomes would produce higher prices.

Physical facilities for community services (such as culinary water, sewer, and schools), which are already strained, would have additional demand put on them. This situation could be aggravated by the fact that the coal mines do not add significantly to the local tax base. A population increase of 10,000 would require approximately 3,000 dwelling units in an area already experiencing housing shortages.

Varying levels of resident satisfaction were registered in community surveys, indicating possible adverse impacts on the lifestyle of area residents resulting from increasing population. Crime rates, alcohol and drug abuse problems, mental health caseloads, and family problems have all increased concurrent with recent population growth in the area. The additional population resulting from IPP-related coal mining would add to these problems.

Lynndyl Site

Quality of Life and Coal Source Area

The effects of construction of IPP at the Lynndyl Site would be essentially the same as described for Salt Wash.

Human Health and Safety

Primary Project Area

The following numbers and types of accidents could be expected at the plant site:

	Construction (Peak Year)	Operation and Maintenance (Average Year)
Accidents	453	31
Lost Work Day Accidents	149	8
Fatalities	0.73	0.128

Potential for traffic accidents would also increase. During the peak population year (1987), 324 automobile accidents and 3 traffic deaths could be expected. During the operation of the plant, 150 accidents and 1 fatality per year could be expected.

Train operation would increase ambient noise levels in the vicinity of the tracks. Potential collisions with animals and vehicles, and heavy equipment accidents would be safety hazards associated with the railroad.

Chemical oxidants, audible noise, and electromagnetic and electrostatic induction would be produced by the transmission line but would be below the levels generally considered hazardous to human health and safety. Other potential hazards are aircraft collisions with the lines, damage and injury due to collapse of towers or falling conductors, and electrocution.

Human Health and Safety

Effects upon human health and safety would be similar to those described for Salt Wash.

ALTERNATIVES TO THE INTERMOUNTAIN POWER PROJECT

ALTERNATIVES TO THE INTERMOUNTAIN POWER PROJECT

This section discusses other ways of obtaining additional electrical energy and the environmental consequences of no action.

A. PURCHASE OF OTHER POWER

Participants in IPP are divided by shares as follows:

Utah and Nevada Participants	42.057 percent	1,261.71 MW
City of Anaheim (California)	10.225 percent	306.75 MW
City of Burbank (California)	1.704 percent	51.12 MW
City of Glendale (California)	1.704 percent	51.12 MW
City of Los Angeles (California)	34.084 percent	1,022.52 MW
City of Pasadena (California)	3.409 percent	102.27 MW
City of Riverside (California)	6.817 percent	204.51 MW
	100 percent	3,000 MW

Without IPP construction, the participants would need to obtain 1,026 MW from other sources by 1995. Purchasing of power is one alternative. All of the IPP participants are currently purchasing peaking and emergency power from other sources. However of all the IPP participants only three currently purchase base load power and they would continue to do so should IPP be built.

Contact with each participant, as well as the Southern California-Edison Power Company and the Administrative Manager for the Western Systems Coordinating Council, indicates that no additional base load power is available. The Public Utilities Commission in Utah has indicated the power from IPP for the Utah participants is justified.

The Energy Resources Conservation and Development Commission has stated that IPP appears to be needed by the California participants to help assure an adequate reserve margin when combined with other projects and purchase power arrangements likely to exist in the mid-1980s.

B. REPOWERING OR UPDATING OF EXISTING FACILITIES

The requirement for new generation may be postponed or eliminated through increased use of existing capacity by repowering existing oil-fired generating units or operating existing plants at a higher output. However, most older units in the IPP participant's systems are now operating at or near maximum output. Therefore, uprating of existing units, even if feasible, would provide minimum additional capacity and energy.

In repowering, the existing oil-fired generating facility is coverted into a combined-cycle generating facility by adding combustion turbines with waste heat recovery boilers. The exhaust gases from the combustion turbines produce additional steam to drive existing steam turbines. This conversion could provide intermediate capacity, but would not provide additional economical

base-load generation. The reliability of repowering existing oil-fired units would be dependent on availability of oil from foreign supplies (IPP, 1979).

C. POSTPONED RETIREMENT

There are no retired units within the IPP participants' service areas that could be recommissioned for use. At the present time, all the participants with existing generation are considering or have already delayed retirements of older units beyond their normal or economic life because the addition of new capacity is not keeping pace with the projected demands (IPP, 1979).

D. BASE LOAD OPERATION OF PEAKING OR INTERMEDIATE UNITS

Most peaking and intermediate units operated by the IPP participants are oil-fired generating facilities that operate with reduced capacity factors. Changing their status to base-load units would require increased use and dependence on oil resources, which are already in short supply. There could be a significant increase in maintenance requirements on these units, thereby reducing system reliability (IPP, 1979).

E. CONSERVATION OF ELECTRICAL ENERGY

Since the Arab oil embargo of 1973, energy conservation has received greater emphasis as a means of postponing or as an alternative to construction of new electrical generating facilities. The predicted average annual electrical energy growth rate for the IPP participants is 4.2 percent. This compares to a 4.3 percent rate of growth for all electrical utilities in the State of California (California Energy Trends and Choices, 1977) and a 6.0 percent rate for the United States (Dupree and Corsentino, 1975).

Voluntary conservation, as a by-product of petroleum shortages has lowered the predicted electrical energy growth rate. The participants have taken steps to conserve energy. Since 1975, IPP participants' forecasts of peak demands and energy requirements include the effects of conservation.

The reduced forecasted growth rates of system annual peak demand are based on the assumption that consumers will continue to take energy conservation measures. Some of the participating utilities began an effort of encouraging energy conservation as early as 1969. These efforts include such measures as (IPP, 1977):

a. Consultation services to consumers, architects, and engineers regarding the most efficient ways of utilizing electrical energy.

b. Suggesting designs of buildings and installation of equipment to optimize energy conservation.

c. Conducting systems analysis studies for customers to ensure optimum utilization of energy.

d. Providing information and recommendations on peak load controlling devices and on power-factor correction.

e. Working with elected officials and state agencies to develop useful laws and codes to eliminate wasteful energy practices.

f. Participating in the development of energy conservation programs for the State of California and the nation through representation on the Federal Power Commission Technical Advisory Committee on Energy Conservation and through membership in the American Public Power and other organizations.

Since 1975, IPP participants' forecasts of peak demands and energy requirements include the effects of conservation.

"Additional conservation can reduce these needs even further; however, it is unlikely that these effects could erase the need for the project" (Ref: Letter dated January 13, 1978--Richard L. Maullin, Chairman California Energy Commission to Guy Martin, Assistant Secretary for Land and Water Resources, U.S. Department of the Interior).

F. HYDROELECTRIC GENERATING FACILITIES

There are few remaining sizable hydroelectric dam sites in the IPP participants' service areas that are available for possible development. Some of the IPP participants recognize potential pumped storage sites in their service areas. However, these facilities are for peaking rather than base-load generation.

It has been estimated that the proportion of hydroelectric generation nationally could be increased by 50 percent of its current level. The additional hydroelectric generation could require the use of scenic areas, such as the Grand Canyon on the Colorado River or Greys Canyon on the Green River.

Low-head hydroelectric generation (a water "drop" of less than 60 feet) and European bulb-turbine equipment is being investigated. These investigations include economic, siting, and technology reviews and it is not expected that this technology can contribute significantly in the time frame of the middle 1980s (USDI, 1979).

G. GAS/OIL-FIRED GENERATING FACILITIES

One of the essential features of base-load generation is the long-term availability of fuel. Because natural gas consumption by the IPP participants is currently being curtailed by the Powerplant and Industrial Fuel Use Act (PIFUA) and dependable supplies of this scarce fuel are not currently available on a long-term basis, the use of natural gas in a conventional base-load generating facility was not given consideration.

Use of fuel oil in conventional oil and gas units has similar deficiencies. Domestic oil production is declining and supplies of low-sulfur fuel oil are limited. Competition for fuel oil has increased and the price for fuel oil is projected to increase substanially. The current oversupply of Alaskan crude oil on the West Coast is considered a temporary situation that will not materially affect either the long-term cost trends or the national policy to switch from oil and gas to other fuels for power generation. These factors eliminate fuel oil as a viable alternative. Additionally, PIFUA prohibits or restricts the use of petroleum in existing or new power plants.

Synthetic and liquified natural gas were both eliminated as alternative fuels for a conventional oil and gas unit because of uncertainties associated with long-term availability in large quantities and the expected high costs of these fuels (IPP, 1979).

H. NUCLEAR POWER PLANTS

Participation in nuclear power plants is being pursued by some of the IPP participants. Additional nuclear power to meet the need for the project was not selected by IPP participants because of the uncertainties related to licensing lead time--including siting, design, construction, and operating criteria (IPP, 1979).

I. GEOTHERMAL ENERGY CONVERSION

Geothermal resources are known to exist in California, Utah, and Arizona. Many of the California IPP participants are taking part in various geothermal exploration, development, and demonstration projects, primarily in the Imperial Valley area of California. Participation in these projects and other geothermal explorations is planned to result in the addition of geothermal resources in the 1990 time frame. Even with this active development and inclusion of significant amounts of geothermal generation in local resource planning, sufficient generation would not be available to replace IPP. Only one possible commercial field in Utah, the Roosevelt Hot Springs Unit near Milford, is currently being developed. It is estimated by Phillips Petroleum Company and the University of Utah Department of Geology and Geophysical Sciences that this resource might contribute a total of 300 megawatts. The first 52 megawatt power plant could be built by June 1982. Growth would be determined by the development of the steam field and would probably allow additional 52 megawatt units to be added in 2-year increments until the 300 megawatt capacity is reached (USDI, 1979).

J. SOLAR ENERGY CONVERSIONS

Studies have indicated that the area served by the IPP participants is probably the most likely region for solar-electric energy application of any area in the United States. Therefore, several of the participants are actively supporting research to accelerate the technology development. To assist in the development of solar energy in the service area of the IPP participants, solar insulation data are being measured extensively throughout the service areas of western utilities.

The primary development in solar electric generation is thermal conversion, which collects sunlight and transfers heat to a working fluid to generate electricity to provide thermal energy. Solar thermal-electric conversion systems are relatively high-temperature thermodynamic cycles to convert solar energy to electricity with high efficientcy and reject waste heat to the environment at the lowest possible temperatures.

The nation's first large solar electric generating plant is being designed by the Department of Energy for operation in the early 1980s. This would be a 10 megawatt unit and larger units would probably not be developed before the end of the century. Large areas of land are required for facilities of this type (USDI, 1979).

Solar thermal conversion may become an alternative means of generating peak and intermediate electric power in this century in the southwestern United States if research, development, and demonstration programs are successful. It is not expected that these technologies would become commercially or economically available for large-scale application to base load plants the size of IPP in the time frame required.

K. WIND ENERGY CONVERSION

Wind energy may become a more economical near-term alternative energy source in certain areas of the country. Several factors determine what faction of the total installed wind power capacity is effective capacity. Some of these factors include (1) the wind characteristics of each particular site, (2) the number and geographic dispersion of the various wind turbines, (3) the fraction of the total generating capacity that is composed of wind power, (4) the utility's load characteristics and mix of conventional generating units, and (5) the required level of system reliability.

The development schedule for large wind turbines is closely tied to existing federal programs. Assuming a 3-year program of testing and debugging, commercial designs might be available in 1982, with the first commercial machines in operation by 1985 or 1986. The actual date for commercial operation depends on the progress of the program in reducing costs and the avoidance of major technical problems. Development of wind-energy resources would depend on continued funding for the research and development and demonstration program (IPP, 1979).

L. SOLID WASTE ENERGY CONVERSION

Although large quantities of solid waste are produced in the IPP participants' service areas, there are no suitable suppliers of refuse-derived fuel (RDF). Market penetration for solid RDF has been severely restricted by air-pollution restrictions and the cost of facilities for producing liquid or gaseous RDF.

RDF (liquid or gaseous) may become an alternative if decreased process costs make it competitive with other fuels. Present estimated costs are approximately twice the cost for a combined-cycle generating facility fueled with low-sulfur oil. New and modified processes are appearing that may reduce costs to competitive levels if these systems prove out on a technical basis. It should be noted, however, that if liquid and gaseous RDF are used in the future, they more than likely would displace oil fuels in existing generator boilers and would have little or no effect on the need for new generation facilities (IPP, 1979).

M. COAL ENERGY CONVERSION

Efforts are being made to develop technology that would permit the production of relatively clear synthetic fuels from western coals. The resulting clean low or intermediate energy gas, liquid, or solid fuels could be used in traditional or advanced fossil-fired generating facilities.

Most advanced of the processes is the solvent-refined coal process in which coal is partially hydrogenated and solvent extracted to yield a solid or liquid fuel low in sulfur and ash. Although chemically and physically somewhat different from raw coal or refined petroleum, these products can be acceptable power plant boiler fuels in terms of current emission standards and product cost. Pilot-plant production and test burning of these fuels have been done successfully.

The major unresolved questions relate to the adequacy of the lowered sulfur content to meet future standards and the costs. The clean liquid fuels should be acceptable, but the clean solid fuels may not meet those standards without additional flue gas desulfurization.

Coal gasification can be accomplished in moving bed, fluidized bed, or entrained bed reactors. Although many gasifiers are under development, most of these developmental and commercial gasifiers appear capable of producing a clean gas fuel that can be used in combined cycles or fuel cells.

Experience to data indicates that the availability of coal conversion tehnology on the scale and time frame required for IPP cannnot be considered likely. Furthermore, the uncertain status of air quality requirements does not permit reasonable estimates of overall plant economics (IPP, 1979).

N. TAR SANDS

Utah has 95 percent of U.S. tar sands with a reserve of 20 to 25 million barrels of oil. The cost of oil from the tar sands would be higher than the present crude oil prices and this, together with higher uses of petroleum, economically prohibits the use of oil from tar sands in electrical power generation (USDI, 1979).

O. OIL SHALE

About 90 percent of the nation's oil shale reserves are in the states of Colorado, Wyoming, and Utah. Technology has not yet been developed to the point where oil shale can be used for electric power generation. Furthermore, when it is developed, the cost would be much higher than present petroleum products and it is not expected to be used for electrical power generation. Some gas by-products from the development of oil shale might be used in gas turbines. This would have to be investigated as the oil shale is developed (USDI, 1979).

P. NO ACTION

Under the no action alternative, the power generating reserve margins of the IPP participants would be reduced or eliminated. The following summarizes the overall reduction in reserve margins for the IPP participants that would result without the project:

	1985	1990	1995
Estimated Peak Demand (MW)	9,880	12,112	14,909
Generating and Purchase Capability Without IPP (MW)	11,252	11,671	13,883
Reserve Margin	1,372	-441	-1,026
Percent of Peak Load Reserve Margin[a]	+14	-3.6	-6.9

Source: IPP

[a] Electric Utilities require a 15 to 25 percent active reserve margin to maintain system reliability.

The companies would need to purchase power from other companies, not only during maintenance operations or contingencies, but for firm peak load.

If power companies are to meet projected demands, power from other sources would be needed. Several plants are in various stages of planning, but as of now, all are fully subscribed for projected base loads. The California proponents of IPP are participating in other proposed base power sources are:

Source	% Participation of IPP Participants	MW
Non-Site Specific[a] (Geothermal)	Undetermined	120
San Onofre 2 and 3 (Nuclear)	1.6	36.5
Combustion Turbine (Including combined cycle)	na	358
		544.5

[a]May include such sites as Roosevelt Hot Springs (near Milford, Utah) and Coastal Hot Springs (near Inyokern, California).

Most IPP participants promoted voluntary conservation measures during the "energy crisis" in 1974 and savings as high as 25 percent were realized by some power consumers. These measures proved economically advantageous, especially with commercial users, and are still being practiced. There is considerable controversy concerning additional energy savings which could be realized through voluntary conservation measures. A study indicates that as high as 10 percent of the utilities projected use could be eliminated by 1985 (Cercoc, 1977).

Regulatory agencies could enforce extreme conservation measures even resorting to revolving blackouts (certain part of each service area would be without power for part of each day). Indications are that "No Action" could bring about mandatory conservation measures (Cercoc, 1977).

Materials and supplies which would be committed to IPP would continue to be available for other uses. If the no action alternative were chosen, water that would have been required for the plant could be used for agricultural or other industrial purposes. For example: the water could be used for alternative energy sources, such as coal gasification or oil shale development. No plans for these alternative uses are currently known and their impacts have not been analyzed.

In the same respect, if the coal were not devoted to IPP it could be used by other generating units, for coal gasification, petro-chemicals, or held in reserve for some future use.

All unavoidable impacts described for either the Salt Wash or Lynndyl sites (to air quality, vegetation, animal life, minerals, land, cultural, water, scenic, and human resources) would be eliminated by use of the no action alternative.

CHAPTER 9

CONSULTATION AND COORDINATION

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CONSULTATION AND COORDINATION

I. INTRODUCTION

This chapter discusses the consultation and coordination conducted in preparation of the environmental statement (ES). Items discussed include: a brief synopsis of the development of the statement; organization of the interagency team; federal, state, local and private individual contacts; adherence to mandatory federal law; and significant meetings held. Organizations that will receive a copy of the draft statement and be requested to submit written comments are listed. Copies of this document can be found in the office of the participants and in the Utah BLM State Office in Salt Lake City, Utah.

A. HISTORY OF CONSULTATION AND COORDINATION

By memorandum dated May 21, 1974, the Secretary of the Interior assigned the Bureau of Land Management lead responsibility for preparing an environmental impact statement on the proposed Intermountain Power Project. As a result, the Director of the Bureau of Land Management delegated this responsibility to the Utah State BLM Director by memorandum dated November 18, 1974. Beginning in February of 1975, proponents of the Intermountain Power Project (IPP) met with various federal agencies, including BLM, to discuss the proposal. On November 9, 1976, IPP filed formal application for the Salt Wash plant site and ancillary facilities.

Subsequently, the BLM requested formal assistance from the U.S. Forest Service and U.S. Geological Survey. These agencies each provided one or more individuals to the interagency team preparing the statement. Other agencies provided information used in impact assessment and indicated they were interested in reviewing the Draft and Final ES.

B. ORGANIZATION OF THE INTERAGENCY TEAM

In August, 1976, an interagency, interdisciplinary ES team was organized in the Richfield District Office, Richfield, Utah. The primary interagency team effort involved the Bureau of Land Management, U.S. Forest Service, and U.S. Geological Survey. The team personnel represented broad categories of environmental expertise including air quality, soils, vegetation, wildlife, socio-economics, scenic and recreational resources, wilderness, geology and mining, land use, and cultural resources. All members used an interdisciplinary team approach in their analyses and writing activities. A total of about 25 persons have been members of the team throughout various stages of statement preparation.

C. PRE-ASSESSMENT ACTIVITIES

In order to acquaint IPP team members and other federal and state agencies with the Intermountain Power Project proposal, an interagency meeting was held on January 11, 1977, in the Sevier County Courthouse, Richfield, Utah. Several areas of environmental concern were identified and input obtained from agencies having jurisdiction and expertise in the matter. The following agencies participated in the meeting:

Bureau of Land Management
- Utah State Office
- Richfield District Environmental Project Staff
- Richfield District; Henry Mountain Resource Area
- Moab District; San Rafael Resource Area
- Cedar City District Office
- Riverside (California) District Office
- Arizona Strip (Arizona) District Office

U.S. Forest Service
- Intermountain Regional Office (Region 4)
- Fishlake National Forest
- Manti-LaSal National Forest

Interagency Environmental Task Force on Coal
Soil Conservation Service
U.S. Geological Survey
Los Angeles Department of Water and Power
Utah State Department of Natural Resources
Utah State Planning Coordinator
Utah State Division of Wildlife Resources
Utah State Division of Lands
Southeastern Utah Association of Governments
Six County Commissioner's Organization

Other meetings were held and contacts made to identify significant environmental issues and obtain additional input as necessary.

D. SEARCH FOR ALTERNATIVE SITES

The Intermountain Power Project originally proposed the construction of a 3,000 megawatt coal-fired generating facility near Salt Wash in South-Central Utah. A search for alternative locations began when air quality studies indicated that sulphur dioxide concentrations would probably exceed Class I standards within Capitol Reef National Park. Communications between Secretary of the Interior, Cecil Andrus, and Utah Governor, Scott Mattheson, emphasized the need for a joint Federal-State effort to identify potential power plant sites in Utah--especially alternative sites for IPP. In response to this, the Governor directed the Utah Energy Conservation and Development Council to establish an Interagency Task Force on Power Plant Siting composed of Energy Council memebers, federal agency representatives, and representatives from local government. For several months, the Interagency Task Force spent many hours reviewing probable power plant sites. Screening studies were conducted on 13 candidate alternative sites (a list of these sites is found in Chapter 8) and two of them were finally recommended as alternatives to the Salt Wash site--Hanksville and Lynndyl. Air quality studies eliminated the Hanksville site from any further consideration and Lynndyl was selected as the alternative to Salt Wash in November of 1977.

In a letter dated April 4, 1978, the Secretary of the Interior was informed that the IPP Board of Directors had agreed to undertake study of the Lynndyl alternative site. BLM and project proponents met several times to develop procedures and establish responsibility for collecting the data needed to describe the environment and assess impacts. Additional assistance was later

supplied to BLM by the Utah Division of Wildlife Resources and Division of Water Rights to aid in analysis of the Lynndyl alternative site.

Proponents of the Intermountain Power Project approached the Secretary of the Interior's office in the spring of 1978 to request that a single document be written to satisfy the requirements of both the National Environmental Policy Act (NEPA) and California Environmental Quality Act (CEQA). In May, the Richfield District was instructed to work with the IPP proponents to develop arrangements for preparing a joint document. It was decided that the BLM would not attempt to incorporate certain specific requirements of CEQA into the federal ES, but that a working draft of the ES would be submitted to IPP. Project proponents could then supplement the draft with data specific to CEQA.

A preassessment (scoping) team met on June 22, 1978, to identify significant environmental issues and define geographic areas which are of special concern for the Lynndyl alternative. The team was organized from agencies which had responsibility to take official actions or were intimately involved with the preparation of the statement and consisted of:

1. Richfield District (BLM)
2. Utah State Office (BLM)
3. Moab District (BLM)
4. Cedar City District (BLM)
5. Ely District (BLM)
6. Las Vegas District (BLM)
7. U.S. Forest Service (Region 4)
8. Fishlake National Forest
9. Humboldt National Forest
10. U.S. Geological Survey (Interagency Task Force, Regional Coal ES)
11. U.S. Bureau of Reclamation (Region 8)
12. Six County Commissioners Organization (Land Use Planner)
13. BLM Washington Office
14. Proponents of Intermountain Power Project

II. INTERAGENCY AND PUBLIC CONTACT ACTIVITIES

A. FEDERAL CONTACTS

The following chart reflects the number and extent of federal contacts initiated and actions completed in preparation of the draft statement. The comments received from the federal agency contacts were considered in preparation of the statement.

Agency	Nature of Contact	Response	Action Taken
U.S. Forest Service	Requested staff and data assistance.	yes	Provided one interdisciplinary team member and data assistance.
U.S. Geological Survey	Requested staff and data assistance	yes	Provided one interdisciplinary team member and data assistance.

Agency	Nature of Contact	Response	Action Taken
U.S. Fish and Wildlife Service	Request data assistance and formal consultation under the Threatened or Endangered Species Act.	yes	Provided data assistance and formal consultation.
Environmental Protection Agency	Request data assistance.	yes	Provided data assistance and coordination.
Bureau of Outdoor Recreation	Request data assistance.	yes	Provided data assistance.
Bureau of Reclamation	Request data assistance.	yes	Provided data assistance.
Nuclear Regulatory Commission	Request data assistance.	yes	Provided data assistance.
Soil Conservation Service	Request data assistance.	yes	Provided data assistance.
National Park Service	Request data assistance.	yes	Provided data assistance.
National Oceanic and Atmospheric Administration	Request data assistance.	yes	Provided data assistance.
Interagency Environmental Task Force on Coal	Request data assistance.	yes	Provided data assistance.
Economic Development Administration	Request data assistance on the new town.	yes	Provided data assistance.
Federal Aviation Administration	Request data assistance.	yes	Provided data assistance.
U.S. Bureau of Mines	Request data assistance.	yes	Provided data assistance.
Heritage Conservation and Recreation Service	Inform agency of project and request data assistance.	yes	Provided data assistance.
Advisory Council on Historic Preservation	Inform agency of project and request data assistance.	yes	Provided data assistance.

B. STATE CONTACTS

Many agencies of State Government having jurisdictional interests in the project have been contacted and have supplied statement data.

Agency	Nature of Contact	Response	Action Taken
Interagency Task Force on Power Plant Siting	Screening study of alternative sites.	yes	Alternative selected.
Utah Division of Wildlife Resources	Request staff and data assistance.	yes	Provided one staff member and data assistance.
Utah Division of Health, Branch of Environmental Health.	Request data assistance.	yes	Provided data assistance.
Utah State Planning Coordinator's Office	Inform agency of project. Seek information on coal source population estimates.	yes	BLM furnished information and office provided data (see Letter Number 1).
Utah Division of Water Rights	Discuss IPP water rights.	yes	Provided data assistance.
Utah Division of Water Resources	Discuss IPP use of water.	yes	Provided data assistance.
Utah Bureau of Air Quality	Request data assistance.	yes	Provided data assistance.
Utah Department of Transportation	Request data assistance.	yes	Provided data assistance.
Utah Institute for the Study of Outdoor Recreation and Tourism	Request data assistance.	yes	Provided data assistance.
Utah Division of Parks and Recreation	Request data assistance.	yes	Provided data assistance.
Utah Division of State History	Request data assistance.	yes	Provided data assistance.
Utah State Historic Preservation Officer	Request formal consultation under the National Historic Preservation Act.	yes	Provided formal consultation (see Letter Number 2).

Agency	Nature of Contact	Response	Action Taken
Utah Division of Aeronautics	Request data assistance.	yes	Provided data assistance.
Utah Highway Department	Request data assistance.	yes	Provided data assistance.
Utah Department of Employment Security	Request data assistance.	yes	Provided data assistance.
Utah Division of State Lands	Request data assistance.	yes	Provided data assistance.
California Energy Commission	Request data assistance.	yes	Provided data assistance.
California Department of Transportation	Request data assistance.	yes	Provided data assistance.
California Department of Fish and Game	Request data assistance.	yes	Provided data assistance.
California State Historic Preservation Officer	Request formal consultation under the National Historic Preservation Act.	yes	Consultation initiated.
California Native American Heritage Commission	Inform agency of project and request consultation.	yes	Comments received.
California Department of Transportation	Request data assistance.	yes	Provided data assistance.
Nevada Department of Transportation	Request data assistance.	yes	Provided data assistance.
Nevada Department of Fish and Game	Request data assistance.	yes	Provided data assistance.
Nevada State Historic Preservation Officer	Request formal consultation under the National Historic Preservation Act.	yes	Provided formal consultation (see Letter Number 3).
Arizona Department of Health	Request data assistance.	yes	Provided data assistance
Arizona State Historic Preservation Officer	Request formal consultation under the National Historic Preservation Act.	yes	Provided formal consultation. (see Letter Number 4).

Agency	Nature of Contact	Response	Action Taken
New Mexico Department of Fish and Game	Request data assistance.	yes	Provided data assistance.

Initial contact with the Native American Heritage Commission was made on November 27, 1978 to determine the consultation required by California state law to deal with Native American interests. On February 21, 1979, a letter was prepared explaining the project and sent (along with topographic maps) to the commission requesting comments. On May 8, 1979, the BLM received a reply from the commission stating their authority and purpose and outlining the type of consultation that would be necessary. As a result of this action, special mitigation dealing specifically with California Native American issues appears in Volume I, Chapter 4.

C. LOCAL GOVERNMENT

Many public officials at the local level were advised of the project. Their views and comments were considered in preparation of the statement.

The following have been consulted:

Southeastern Utah Association of Governments (see Letter Number 5)
Six County Commissioners Organization (Utah) (see Letter Number 6)
Office of Industrial Development (Utah)
Community and Natural Resource Planning (Utah)
Millard County Clerk (Utah)
Juab County Clerk (Utah)
White Pine County Manager (Nevada)
Lincoln County Manager (Nevada)
Clark County Recorder (Nevada)
San Bernardino County (California)

D. PUBLIC CONTACTS

The BLM Richfield District mailed information sheets on the Salt Wash proposal to approximately 285 individuals and other interested parties in June of 1977. The response to this mailing was less than 10 percent. Similar information sheets dealing with the Lynndyl alternative were mailed to 493 individuals and interested organizations in December of 1978. Two responses were received. The Los Angeles Department of Water and Power, as lead agency, mailed a notice to approximately 180 public agencies, officials, private organizations, and individuals.

III. COORDINATION IN REVIEW OF THE DRAFT STATEMENT

The following list represents government organizations that will receive a copy of the draft statement and be requested to submit written comments.

A. FEDERAL AGENCIES

Advisory Council on Historic Preservation
Department of Agriculture
- Forest Service
- Soil Conservation Service

Department of Commerce
- National Oceanic and Atmospheric Administration

Department of Defense
Department of Energy
- Bonneville Power Administration
- Office of Energy Research
- Office of Environment
- Western Area Power Administration

Department of Health, Education and Welfare
Department of Housing and Urban Development
Department of the Interior
- Bureau of Indian Affairs
- Bureau of Mines
- Bureau of Reclamation
- Fish and Wildlife Service
- Geological Survey
- Heritage Conservation and Recreation Service
- National Park Service
- Office of Surface Mining

Department of Labor
- Mine Health and Safety Administration
- Occupational Safety and Health Administration

Department of Transportation
- Federal Aviation Administration
- Federal Highway Administration

Environmental Protection Agency
Interstate Commerce Commission

B. STATE AGENCIES AND ENTITIES

State of Utah
- Utah State Agencies Clearing House (A-95)

State of Arizona
- Governor's Clearing House

State of Nevada
- Governor's Clearing House

State of California
- Governor's Clearing House

C. LOCAL AGENCIES

County Commissioners:
- Carbon, Castle Dale, Emery, Garfield, Iron, Juab, Millard, Piute, Sanpete, Sevier, Utah, Wayne (Utah); Lincoln, White Pine, Clark

(Nevada); Mojave (Arizona); San Bernardino (California).
Five-County Association of Governments (Utah)
Six-County Commissioners Organization (Utah)
Southeastern Utah Assocation of Governments

Copies of the draft statement will also be submitted to these towns interested in and affected by the project.

D. NONGOVERNMENTAL ORGANIZATION

Archaeological Society of Utah
Canyon Country Coalition
Chamber of Commerce (Carbon County)
Chamber of Commerce (Salt Lake Area)
Common Cause
Conservancy Resource Center
Council of Utah Resources
Defenders of the Outdoor Heritage
Defenders of Wildlife
Desert Protective Council
Enchanted Wilderness Association
Environmental Awareness
Environmental Defense Fund, Rocky Mountain/Great Plains
Escalante Wilderness Committee
Friends of the Earth
Good Earth
Institute of Ecology
Izaak Walton League - Utah Division
ISSUE
League of Women Voters
Mearns Wildlife Society
Mineralogical Society of Utah
National Parks and Recreation Association
Natural Resources Defense Council Inc.
National Wildlife Federation
Nature Conservancy
Pro-Utah, Inc.
Rocky Mountain Center on Environment
Rocky Mountain Federation of Mineralogical Societies
Rocky Mountain Sportsmen Association
Save Our Canyons Committee
Sierra Club
Society of Conservation of Bighorn Sheep
Utah Audubon Society
Utah Cattlemen's Association
Utah CLEAR
Utah Environment Center
Utah Farm Bureau
Utah Geological and Mineral Survey
Utah Lung Association
Utah Mining Association
Utah Nature Study Society
Utah Sportsmen Association

Utah Water Users Association
Utah Wildlife and Outdoor Recreation Federation
Utah Wool Growers Association
Wasatch Mountain Club
Western Rockhound Association
The Wilderness Society
Women's Conservation Council of Utah

E. PRIVATE COMPANIES AND UNIVERSITIES

Irrigation Companies (Millard County, Utah)
Proponents of the Intermountain Power Project
Coal companies in the Carbon County-Emery County area.
Brigham Young University
University of Utah
College of Eastern Utah
Southern Utah State College
Dixie College
University of Nevada, Las Vegas

F. PUBLIC HEARINGS

Public hearings will be held at designated locations in Utah, Nevada and California to receive public comment on the adequacy of the draft environmental statement. Times, dates, and locations for the hearings will be announced in the Federal Register and through press releases.

Scott M. Matheson
Governor

Kent Briggs
State Planning Coordinator

STATE OF UTAH
Office of the
STATE PLANNING COORDINATOR
118 State Capitol
Salt Lake City, Utah 84114
(801) 533-5245

February 27, 1979

Roy Edmunds, Environmental Coordinator
Bureau of Land Management
Richfield District Office
150 East 900 North
Richfield, Utah 84701

Dear Mr. Edmunds:

This letter is in response to issues raised during our February 13 conversation concerning the BLM Memorandum, "Socioeconomic Analysis for IPP," dated January 12, 1979. The Memorandum requests information on the rationale for the state's Central Region population projections and a response to the Six County Commissioners' Organization's criticisms of them.

The Commissioners' Organization has asserted that the state's Central Region population projections are inadequate because (1) they fail to reflect the level of coal production already attained in the Emery-Sevier County area, and (2) the projections rest on assumptions concerning the commuting of miners between areas of residence and workplaces that do not reflect the current (and therefore future) situation. In addition to stating our position concerning these points, I want to clarify the difference between a projection and a prediction as I think it has a material bearing on the Commissioners' line of criticism. I conclude that in the absence of reliable information not considered in the Central Regional Socio-Economic analysis showing the contrary, the population projections presented in the draft environmental statement are adequate.

Population Projections Are Not Predictions of the Future

Population projections are conditional statements of the consequences of assumptions, they are not predictions. They do not tell the user what the future will be, only what might happen if certain specified things occur.

The population projections in the Environmental Statement on the Development of coal resources in Central Utah are based on specified, assumed levels of coal production in the Region during the period 1975 to 1990. If coal mining does not occur as stated in these assumptions

Roy Edmunds
February 27, 1979
Page 2

there is no guarantee that population projections will describe evolving Regional conditions very well. The importance of the assumptions, and of formulating them adequately, is clear.

The Central Region coal production alternatives were each allocated to four subregions, C-1, C-2, C-3, and C-4. In C-4 (the Emery-Sevier area), coal mining output currently exceeds that assumed in the environmental statement. But the range of C-4 coal production treated in the environmental statement rises from a current 1.2 million tons per year to 7.2 million tons per year in 1990. Though the population projections, tied to these assumed conditions in coal output, therefore cannot describe the actual current situation, they do permit the analysis of the impacts of a changing coal mining industry in the C-4 area over a range of output broad enough to cover expected future conditions.

The fact that current actual coal output in C-4 exceeds that assumed may be reason for re-examining the assumptions. Whether it is or not depends on expected future conditions in the industry. Will coal mining in C-4 exceed that assumed by 1990? If not, and if the assumption is a plausible representation of unfolding future conditions, then the population projections may be an adequate statement of the consequences of expanding area coal production. A market study for C-4 coal (not undertaken as part of the environmental analysis) would be required to discredit the assumptions employed in the environmental statement. The uncertainty of the future and the lack of a market study both underscore the importance of examining a range of coal output and associated socio-economic consequences.

The impacts of coal mining analyzed in the environmental statement (including the population projections) are differences that would arise should an assumed path of coal development occur that is different from a projected area baseline condition. The adequacy of the projections of population is a matter of how well they describe the changes in population resulting from differing levels of coal production; adequacy does not turn on how well the future *per se* is predicted.

Before leaving this topic an additional point should be made. Expected baseline economic conditions in the C-4 area are such that the kind of growth currently being experienced would not occur in the absence of increasing coal mining and associated activity. Reasonably considered, no other industrial sector has the potential to support such growth. The current expansion in Sanpete and Sevier Counties is due to increased coal production in the Region.

Labor force data reported by the Utah Department of Employment Security (Utah Annual Report 1977, Labor Market Information, Volume III, November 1978) show declining employment in some of the Region's counties. Non-agricultural payroll employment declined in Sanpete and Piute Counties, 1976-1977, and generally stagnant economic conditions were to be found there. It is not unreasonable to expect that the entire Six-County Region would appear as these counties did were it not for coal

Roy Edmunds
February 27, 1979
Page 3

mining and related activity. Manufacturing employment, a key component of the economic base in Sanpete and Sevier Counties, declined there during 1976-1977.

The dramatic affect on the area economy of increasing coal mining is evidence of the thinness of the economic base, and though beneficial in an economic sense at present, such conditions indicate the potential for distress should a downturn in coal output be experienced. In the absence of a market study indicating otherwise, current levels of mining output in C-4 may be temporarily high.

Worker Commuting Patterns In The C-4 Sub-Region

Currently, many miners working in the Emery-Sevier area commute from residences in the Salina area of Sevier County. This means long-distance travel for workers, which translates into added time on the job and added expenses for mining companies. It is reasonable to expect that increased coal mining would create pressures for new roads and new places of residence in the Emery-Moore area of Emery County.

. Transportation by truck of coal mined in C-4 has magnified mining-related impacts in Sevier County. But such a means of transportation is feasible only to a point, beyond which a railroad is the more likely alternative. Because the mining aspect of the Intermountain Power Project, Salt Wash site, is an integral part of the environmental statement on Central Regional coal development, rail transportation of coal is all the more probable (the Project anticipates construction of a railroad to meet its coal transportation requirements). This could mean transportation of coal to the east, rather than west through Salina. The related road network between mines and railroad could be a factor altering the commuting patterns of miners.

In contrast, the Six County Commissioners' Organization expects a continuation of the current situation, with its strong emphasis on residences for workers in Sevier County. Cited as support for this is the lack of public and private investment in the Emery County area. But lack of investment is not a sufficient indicator of future conditions because levels of investment respond to changing pressures and demands. Moreover, some communities in Sanpete and Sevier counties would require new public investment to accommodate a large increase in population and therefore differ only in degree from places in southwestern Emery County.

Such considerations as these underlie the county and sub-county population projections reported in the environmental statement. Those who prepared the projections contend that higher levels of coal mining, coupled with a potential shift in the means of transporting coal, would increase the percentage of workers residing in Emery County.

Participation of Association of Governments' Staff
In Socio-Economic Analyses

Under contract with this Office, staffs of the Southeast and the

Roy Edmunds
February 27, 1979
Page 4

Six-County Associations of Governments produced portions of the socio-economic analyses for environmental impact statements. This work included allocating the Bureau of Economic and Business Research county-level population projections to communities. Assumed commuting patterns were of material importance in deriving the county level projections.

On October 12, 1977, shortly after work on this project by the Association of Governments' staffs had commenced, and soon after the U.S. Geological Survey had formulated its alternative coal production assumptions for the Region, this office held a meeting to develop a set of assumptions concerning commuting by miners between the mines and potential residential areas. Representatives of the Southeast and Six-County Associations of Governments, the Bureau of Economic and Business Research, and this office were present. The result was a set of assumptions that became the basis for the county-level population projections associated with subregional (C-1, C-2, C-3, and C-4) coal production alternatives.

Naturally such assumptions can be changed after having been formulated. But insufficient evidence surfaced during the analysis of regional socio-economic conditions to warrant changing them.

Sincerely,

Douglas C.W. Kirk

Douglas C.W. Kirk, Associate
State Planning Coordinator

DCWK/jo

STATE OF UTAH
Scott M. Matheson, Governor
DEPARTMENT OF DEVELOPMENT SERVICES
Michael D. Gallivan
Executive Director
104 State Capitol
Salt Lake City, Utah 84114
Telephone: (801) 533-5961

July 31, 1978

Craig Harmon
EPS Archeologist
Bureau of Land Management
Richfield District Office
150 East 900 South
Richfield, Utah 84701

RE: Memorandums of Understanding for Intermountain Power Project Environmental Statement and Parker Mountain Range Management Environmental Statement

Dear Mr. Harmon:

The staff has reviewed the enclosed memorandum of understanding and concur with its intentions. If properly implemented, it will adequately protect cultural resources, although we will reserve the right to comment on the technical aspects of surveys and research. This letter is not to be used as clearance for the EIS. We will comment when the draft EIS is prepared.

If you have any questions or concerns, please call or write Wilson G. Martin, Preservation Development Coordinator, Utah State Historical Society, 307 West 200 South, Salt Lake City, Utah 84101 533-6017.

Sincerely,

Michael D. Gallivan
Executive Director
and
State Historic Preservation Officer

WGM:jr

CULTURAL RESOURCES
MEMORANOUM OF UNOERSTANDING
INTERMOUNTAIN POWER PROJECT ENVIRONMENTAL STATEMENT

BETWEEN

THE BUREAU OF LANO MANAGEMENT
ANO
THE STATE OF UTAH

I. PURPOSE

The Bureau of Land Management, hereinafter referred to as the Bureau, is preparing the Intermountain Power Project Environmental Statement (IPP ES) under the provisions of the National Environmental Policy Act of 1969. The Bureau has determined that cultural values could be damaged or lost as a result of actions proposed in the IPP ES. The following kinds of actions are proposed on public lands administered by the Bureau:

a. Non-Bureau Energy Initiative (NBEI) proposals submitted to the Bureau. These include proposals for rights-of-way and other land uses involving the surface of public lands.

b. Major transportation network proposals in connections with power plant operation.

The Utah State Historic Preservation Office, hereinafter referred to as the State, is interested in assuring that cultural values in Utah be protected. The Bureau and the State have consulted and agree as to the measures, outlined in this agreement, which should be undertaken to protect these values should authorization be granted to use public lands in Utah administered by the Bureau for the purpose of any of the above mentioned proposed actions. In this agreement, "cultural resources" mean data and sites which have archaeological, historical, architectural, or cultural importance and interest.

Investigators will be qualified to evaluate these "cultural resources." Qualifications of investigators will be submitted to the State Historic Preservation Officer.

II. AUTHORITY

This agreement is authorized under the Federal Land Policy and Management Act of 1976 and the National Historic Preservation Act of 1966. It is in accord with Bureau policies and programs. It does not abrogate nor amend any other agreement between the Bureau and the State.

III. RESPONSIBILITIES AND PROCEOURES

The Bureau will comply with 36 CFR 800 in identifying sites which are listed in or eligible for inclusion in the National Register of Historic Places.

A. As part of the planning and environmental analysis required prior to any decision to authorize rights-of-way for the proposed IPP, the Bureau will search for archaeological and historical literature concerning the IPP area. Class II studies (designed sampling inventories) have been conducted on all public lands that would be affected by the IPP proposal and alternatives.

B. After completing the planning and environmental analysis process, should the proposed management be implemented, the Bureau will inform project participants of, monitor compliance with, and enforce the following stipulations:

1. Prior to initiation of ground-disturbing activities, literature searches and intensive surveys will be undertaken on all areas which would be disturbed.

2. Wherever possible and feasible, cultural resources will be avoided by construction and related activities. This will be accomplished mainly by rerouting linear facilities such as transmission lines, roads, fences, and pipelines, and adjusting locations of other facilities.

3. A professional archaeologist may be required to be present when ground-disturbing operations are underway.

4. Subsurface cultural resources that are encountered during any construction will be salvaged if there is no other recourse in such a situation.

C. Wherever it is not possible and feasible to avoid sites that contain cultural values, the Bureau will consult with the State to determine the most satisfactory means of mitigating damage, as required by 36 CFR 800.

D. The Bureau will provide cultural resources reports, technical reports, and other pertinent material to the State.

E. The State will provide the Bureau with a letter, for use as an exhibit in the IPP ES, to the effect that the procedures herein proposed by the Bureau, if correctly implemented, will satisfy the State's interest.

IV. The attached list identifies the specific actions that the Bureau anticipates will be included in the IPP ES. The list may be brought up to date, as necessary, without amending this agreement in any way.

V. IMPLEMENTATION

A. This agreement will become effective on the date of the last signature on this agreement.

B. Either party may request revision or cancellation of this agreement by written notice, not less than 30 days prior to the time when such action is proposed.

C. Any problems resulting from this agreement which cannot be resolved by the Bureau and the State will be referred to the Secretary of the Interior and the Governor of Utah for resolution.

Date: 8/17/78

Paul L. Howard
Utah State Director
Bureau of Land Management
Department of the Interior

Date: July 31, 1978

[signature]
Utah State Historic Preservation Officer

United States Department of the Interior
BUREAU OF LAND MANAGEMENT

NEVADA STATE OFFICE
Room 3008 Federal Building
300 Booth Street
Reno, Nevada 89509

IN REPLY REFER TO
1792
(N-932.8)

JAN 16 1979

MEMORANDUM

To: District Manager, Richfield District

From: State Director, Nevada

Subject: IPP Memorandum of Understanding for Cultural Resources

The attached Memorandum of Understanding (MOU) has been reviewed and signed by the Nevada State Historic Preservation Officer, and the ~~BLM~~ Nevada State Director.

It is our understanding that this MOU will appear in the IPP Environmental Statement as an outline of measures which will be undertaken to protect Cultural Resources at the appropriate planning stages. One copy of the signed MOU will be forwarded to the SHPO and one copy will be retained at NSO.

E. D. [signature]

Enclosure (1)
MOU

cc: State Director, Utah
(N-040)
(N-050)

CONSERVE AMERICA'S ENERGY

Save Energy and You Serve America!

CULTURAL RESOURCES
MEMORANDUM OF UNDERSTANDING
INTERMOUNTAIN POWER PROJECT ENVIRONMENTAL STATEMENT

BETWEEN

THE BUREAU OF LAND MANAGEMENT
AND
THE STATE OF NEVADA

I. PURPOSE

The Bureau of Land Management, hereinafter referred to as the Bureau, is preparing the Intermountain Power Project Environmental Statement (IPP ES) under the provisions of the National Environmental Policy Act of 1969. The Bureau has determined that cultural values could be damaged or lost as a result of actions proposed in the IPP ES. The following kinds of actions are proposed on public lands administered by the Bureau:

a. Non-Bureau Energy Initiative (NBEI) proposals submitted to the Bureau. These include proposals for rights-of-way and other land uses involving the surface of public lands.

b. Major transportation network proposals in connections with power plant operation.

The Nevada State Historic Preservation Office, hereinafter referred to as the State, is interested in assuring that cultural values in Nevada be protected. The Bureau and the State have consulted and agree as to the measures, outlined in this agreement, which should be undertaken to protect these values should authorization be granted to use public lands in Nevada administered by the Bureau for the purpose of any of the above mentioned proposed actions. In this agreement, "cultural resources" mean data and sites which have archaeological, historical, architectural, or cultural importance and interest.

Investigators will be qualified to evaluate these "cultural resources." Qualifications of investigators will be submitted to the State Historic Preservation Officer.

II. AUTHORITY

This agreement is authorized under the Federal Land Policy and Management Act of 1976 and the National Historic Preservation Act of 1966. It is in accord with Bureau policies and programs. It does not abrogate nor amend any other agreement between the Bureau and the State.

III. RESPONSIBILITIES AND PROCEDURES

The Bureau will comply with 36 CFR 800 in identifying sites which are listed in or eligible for inclusion in the National Register of Historic Places.

A. As part of the planning and environmental analysis required prior to any decision to authorize rights-of-way for the proposed IPP, the Bureau will search for archaeological and historical literature concerning the IPP area. Class II studies (designed sampling inventories) have been conducted on all public lands that would be affected by the IPP proposal and alternatives.

B. After completing the planning and environmental analysis process, should the proposed management be implemented, the Bureau will inform project participants of, monitor compliance with, and enforce the following stipulations:

1. Prior to initiation of ground-disturbing activities, literature searches and intensive surveys will be undertaken on all areas which would be disturbed.

2. Wherever possible and feasible, cultural resources will be avoided by construction and related activities. This will be accomplished mainly by rerouting linear facilities such as transmission lines, roads, fences, and pipelines, and adjusting locations of other facilities.

3. A professional archaeologist may be required to be present when ground-disturbing operations are underway.

4. All cultural resources that are encountered during any construction will be salvaged if there is no other recourse in such a situation.

C. Wherever it is not possible and feasible to avoid sites that contain cultural values, the Bureau will consult with the State to determine the most satisfactory means of mitigating damage, as required by 36 CFR 800.

D. The Bureau will provide cultural resources reports, technical reports, and other pertinent material to the State.

E. The State will provide the Bureau with a letter, for use as an exhibit in the IPP ES, to the effect that the procedures herein proposed by the Bureau, if correctly implemented, will satisfy the State's interest.

IV. The attached list identifies the specific actions that the Bureau anticipates will be included in the IPP ES. The list may be brought up to date, as necessary, without amending this agreement in any way.

V. IMPLEMENTATION

A. This agreement will become effective on the date of the last signature on this agreement.

B. Either party may request revision or cancellation of this agreement by written notice, not less than 30 days prior to the time when such action is proposed.

C. Any problems resulting from this agreement which cannot be resolved by the Bureau and the State will be referred to the Secretary of the Interior and the Governor of Nevada for resolution.

1-16-79
Date:

E. I. Rowland
Nevada State Director
Bureau of Land Management
Department of the Interior

5 January 1979
Date

Pamela Crowell
Nevada State Historic Preservation Officer

United States Department of the Interior

BUREAU OF LAND MANAGEMENT
ARIZONA STATE OFFICE
2400 VALLEY BANK CENTER
PHOENIX, ARIZONA 85073

IN REPLY REFER TO
8141/1792 IPP (931)

1/2 RLy 3/13 3/15

MAR 12 1979
3

3

Memorandum

To: State Director, Utah

From: State Director, Arizona

Subject: Memorandum of Understanding with Arizona State Historic Preservation Officer Regarding IPP Proposal

The subject memorandum, signed by Dorothy Hall and myself, is attached, together with Mrs. Hall's cover letter.

B Buffington

Attachment

ARIZONA STATE PARKS

1688 WEST ADAMS STREET
PHOENIX, ARIZONA 85007
TELEPHONE 602-271-4174

RECEIVED
B.L.M. AZ STATE OFFICE
MAR 8 1979
10:00 A.M.
PHOENIX, ARIZONA

March 5, 1979

Bob Buffington, State Director
Bureau of Land Management
Department of the Interior
2400 Valley Bank Center
201 North Central
Phoenix, AZ 85073

RE: Intermountain Power Project-Transmission Line in Arizona
Memorandum of Understanding
DOI-BLM

Dear Mr. Buffington:

I have reviewed the Memorandum of Understanding that the Bureau of Land Management has developed regarding the cultural resource compliance procedures for this project, and I am in general agreement with the contents of the document. Therefore, I have signed it and am returning it to you with this cover letter.

Implementation of the provisions and procedures contained in the Memorandum of Understanding should allow for adequate protection of the State's cultural resources that might be effected by the project. However, I did have an initial hesitation in signing this document because of some of the wording and also because it seemed to me that the role of the Advisory Council on Historic Preservation in this process was not being sufficiently emphasized.

I have since discussed these points with the Salt Lake City BLM office and have been assured that the Advisory Council is familiar with the contents of the document and also that some of the wording that I had questions about was included at the suggestion of the Advisory Council. Therefore, if the Advisory Council is satisfied that under this Memorandum of Understanding the procedures of 36 CFR Part 800, as amended, will be followed, then I have no further objections.

In my opinion, a Memorandum of Understanding is a good initial procedure for this type of project and I will be happy to work with the BLM as the project develops.

Sincerely,

Dorothy H. Hall

Dorothy H. Hall
State Historic
Preservation Officer
Heritage Conservation
Section

DHH:FBF:sw
Enc.

CONSERVING AND MANAGING ARIZONA'S HISTORIC PLACES, HISTORIC SITES, AND RECREATIONAL, SCENIC AND NATURAL AREAS

RECEIVED
B.L.M. AZ STATE OFFICE
MAR 8 1979
10:00 A.M.
PHOENIX, ARIZONA

CULTURAL RESOURCES
MEMORANDUM OF UNDERSTANDING
INTERMOUNTAIN POWER PROJECT ENVIRONMENTAL STATEMENT

BETWEEN

THE BUREAU OF LAND MANAGEMENT
AND
THE STATE OF ARIZONA

I. PURPOSE

The Bureau of Land Management, hereinafter referred to as the Bureau, is preparing the Intermountain Power Project Environmental Statement (IPP ES) under the provisions of the National Environmental Policy Act of 1969. The Bureau has determined that cultural values could be damaged or lost as a result of actions proposed in the IPP ES. The following kinds of actions are proposed on public lands administered by the Bureau:

a. Non-Bureau Energy Initiative (NBEI) proposals submitted to the Bureau. These include proposals for rights-of-way and other land uses involving the surface of public lands.

b. Major transportation network proposals in connections with power plant operation.

The Arizona State Historic Preservation Office, hereinafter referred to as the State, is interested in assuring that cultural values in Arizona be protected. The Bureau and the State have consulted and agree as to the measures, outlined in this agreement, which should be undertaken to protect these values should authorization be granted to use public lands in Arizona administered by the Bureau for the purpose of any of the above mentioned proposed actions. In this agreement, "cultural resources" mean data and sites which have archaeological, historical, architectural, or cultural importance and interest.

Investigators will be qualified to evaluate these "cultural resources." Qualifications of investigators will be submitted to the State Historic Preservation Officer.

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III. RESPONSIBILITIES AND PROCEDURES

The Bureau will comply with 36 CFR 800 in identifying sites which are listed in or eligible for inclusion in the National Register of Historic Places.

A. As part of the planning and environmental analysis required prior to any decision to authorize rights-of-way for the proposed IPP, the Bureau will search for archaeological and historical literature concerning the IPP area. Class II studies (designed sampling inventories) have been conducted on all public lands that would be affected by the IPP proposal and alternatives.

B. After completing the planning and environmental analysis process, should the proposed management be implemented, the Bureau will inform project participants of, monitor compliance with, and enforce the following stipulations:

RECEIVED
B.L.M. AZ STATE OFFICE
MAR 8 1979
10:00 A.M.
PHOENIX, ARIZONA

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3. A professional archaeologist may be required to be present when ground-disturbing operations are underway.

4. Subsurface cultural resources that are encountered during any construction will be salvaged if there is no other recourse in such a situation.

C. Wherever it is not possible and feasible to avoid sites that contain cultural values, the Bureau will consult with the State to determine the most satisfactory means of mitigating damage, as required by 36 CFR 800.

D. The Bureau will provide cultural resources reports, technical reports, and other pertinent material to the State.

E. The State will provide the Bureau with a letter, for use as an exhibit in the IPP ES, to the effect that the procedures herein proposed by the Bureau, if correctly implemented, will satisfy the State's interest.

IV. The attached list identifies the specific actions that the Bureau anticipates will be included in the IPP ES. The list may be brought up to date, as necessary, without amending this agreement in any way.

V. IMPLEMENTATION

A. This agreement will become effective on the date of the last signature on this agreement.

B. Either party may request revision or cancellation of this agreement by written notice, not less than 30 days prior to the time when such action is proposed.

C. Any problems resulting from this agreement which cannot be resolved by the Bureau and the State will be referred to the Secretary of the Interior and the Governor of Arizona for resolution.

Date: 3-12-79

[signature]
Arizona State Director
Bureau of Land Management
Department of the Interior

Date: 3-5-79

Dorothy H Hall
Arizona State Historic Preservation Officer

Community & Natural Resource Planning

SIX—COUNTY COMMISSIONERS ORGANIZATION
P.O. Box 725, Federal Building, 93 North Main
Richfield, Utah 84701

Telephone: (801) 896-8027

February 9, 1979

Mr. Don Pendleton, Director
Bureau of Land Management
150 East 900 North
Richfield, UT 84701

RE: REGIONAL COAL EIS

Dear Mr. Pendleton:

As you know, our office was under contract to supply data to the Utah State Planning Coordinator's Office, and the USGS relative to the socio-economics for the central portion of the regional Coal EIS. Also, I am sure you are aware, there has been some differences of opinion concerning population projections and population allocations relative to coal mining impacts in Sevier and Sanpete counties. We prepared a detailed response to the initial Draft Coal EIS, in which we explained our contention that population projections were too low for our district and the population allocations were incorrect.

We have recently completed further studies into this matter, and at the request of Mr. Roy Edmunds of your staff, we outlined in greater detail our concerns, about the inadequacy of this study. I am enclosing a copy of our further research for your review and comment. We feel this will substantiate our position and that the final draft of Coal EIS be changed to reflect these conditions rather than the formula used at the Bureau of Economics and Business Research at the University of Utah.

Sincerely,

Allen Fawcett

Allen Fawcett
Planner

AF/co

Enclosure

ED. Note --
SEE APPENDIX III-6 FOR COMPLETE DATA.

SOUTHEASTERN UTAH ASSOCIATION OF GOVERNMENTS

GARDELL SNOW
Chairman
WILLIAM K. DINEHART
Executive Director

P.O. Drawer A1 Price, Utah 84501 Telephone 637-5444

February 6, 1979

Roy Edmunds
BLM
Richfield, Utah 84701

Dear Roy,

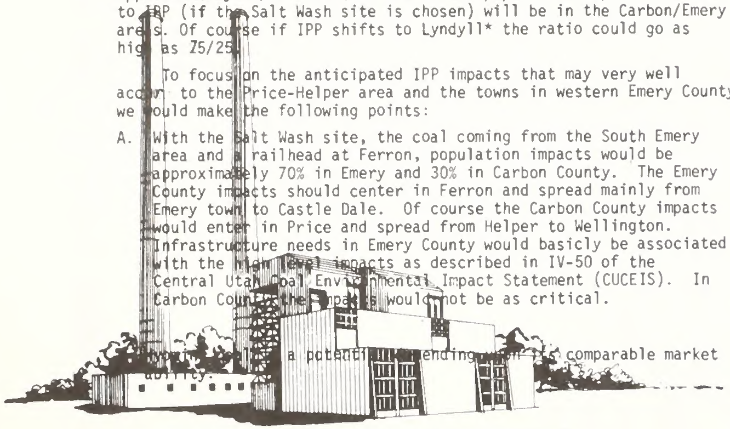
In reference to our meeting last week, here are a few of our comments and concerns about possible IPP impacts. Also please find enclosed the population estimates we are currently using as well as what we consider to be the most accurate of the currently available population projections.

Preliminary data generated by I.P.P. proponents in 1976-77 indicated that they anticipated the population impacts occuring from coal mining necessitated by the proposed project would be evenly split between Castle Valley (Carbon-Emery) and Sevier Valley (Sevier-San Pete). For a variety of reasons we (mainly topographic) we believe that if the Salt Wash site were utilized the distribution of impacts between Castle Valley and Sevier Valley should run approximately 65/35. That is 65% of all population impacts related to IPP (if the Salt Wash site is chosen) will be in the Carbon/Emery areas. Of course if IPP shifts to Lyndyll* the ratio could go as high as 75/25.

To focus on the anticipated IPP impacts that may very well accrue to the Price-Helper area and the towns in western Emery County, we would make the following points:

A. With the Salt Wash site, the coal coming from the South Emery area and a railhead at Ferron, population impacts would be approximately 70% in Emery and 30% in Carbon County. The Emery County impacts should center in Ferron and spread mainly from Emery town to Castle Dale. Of course the Carbon County impacts would enter in Price and spread from Helper to Wellington. Infrastructure needs in Emery County would basicly be associated with the high level impacts as described in IV-50 of the Central Utah Coal Environmental Impact Statement (CUCEIS). In Carbon County the impacts would not be as critical.

[illegible] a potenti[illegible] ending [illegible] comparable market ability.



REGIONAL CLEARINGHOUSE

B. If IPP moves to the proposed Lyndyll site the Carbon/Emery area could receive a slightly larger impact and the Sevier/San Pete area slightly lower as mentioned earlier.

Also the allocation of impacts between Carbon and Emery County would shift north, with the majority of the impact to fall in Carbon County, the ratio probably would be 65% in Carbon and 35% in Emery. This type of impact would not inundate the Price River area's infrastructure, if growth is well managed as it has been in the past.

The main problems associated with this scenerio would be sewage treatment capacity at the Price River Water Treatment plant near Wellington, and the supply of culinary water.

The treatment plant is built in a modular form so expansion would not be difficult. Water supply problems are now being studied, and the proposed Indian Head dam project on the White River would help alliviate this problem but would not completely solve the issue. But with some time and money water supply would not necessarily be a problem.

The impact allocation ratio between Carbon/Emery County of 65/35 could be altered by the construction of the Castle Valley Railroad Spur, which would allow the coal in Emery County (Southern & Central Wasatch Plateau) to be more competetive for IPP and other out of area contracts.

The coal production levels shown in the C.U.C.E.I.S. seem a few years behind schedule. According to our calculations this region should be producing the 24 mty by 1987 and possibly 27 mty by 1990. This of course doesn't include other possible coal production from the proposed Pacific Gas & Electric mines, and Utah Power & Light coal associated with the proposed Wellington power plant.

We appreciate the opportunity presented by your office to present these rather generalized comments on potential IPP impacts to the Carbon-Emery area. We feel that this exchange of data is particularly critical given the current status of the Central Utah Coal EIS. As sub-contractors to the State of Utah for certain portions of the data presented in the C.U.C.E.I.S., it was our understanding that that document would serve as the main data base for site specific EIS's (such as your current effort on IPP) as well as the EIS to be written on the new federal coal leasing policies.

Since we feel that portions of the data presented in the C.U.C.E.I.S. are erronious and that some of the conclusions reached there-in are misleading (reference our letter to the Director of U.S.G.S. dated December 21, 1978), BLM's willingness to hear local viewpoints is singularly gratifying.

If we can be any further assistance in this matter, please contact this organization.

Sincerely,

Lester E. Prall
Lester E. Prall
Program Manager

APPENDICES, GLOSSARY, AND REFERENCES

APPENDIX I-1

NOTE: This information provided by Los Angeles Water and Power in their role as lead State Agency to fullfill the requirements of the California Environmental Quality Act.

INTERMOUNTAIN POWER PROJECT

NEED FOR POWER

Introduction and Background

The Intermountain Power Project (IPP) is studying the design, construction and operation of a 3000-megawatt coal-fueled electric power generating station in Millard County, Utah, to provide needed electrical power primarily for residents of Utah and California.

The Intermountain Consumer Power Association (ICPA) was organized to provide support for hydroelectric power development through the Colorado River Storage Project. Membership consists of the following 30 utilities or cooperatives in Utah, eastern Nevada and southern Wyoming:

Beaver	Kanosh
Bountiful	Kaysville
Bridger Valley (Wyo)	Lehi
Dixie, REA	Logan
Enterprise	Meadow
Ephraim	Monroe
Escalante Valley	Moon Lake, REA
Fairview	Morgan
Fillmore	Mt. Pleasant
Flowell, REA	Mt. Wheeler (Nev.)
Garkane Power	Murray
Heber	Oak City
Holden	Parowan
Hurricane	Spring City
Hyrum	St. George

Except for Mt. Wheeler, Nevada, and Bridger Valley, Wyoming, the majority of ICPA members are Utah municipal and cooperative power systems.

Through ICPA efforts, Colorado River storage power was purchased and distributed to association customers. The Department of Interior, Bureau of Reclamation, notified ICPA in 1970 that additional Colorado River storage power would no longer be available for load growth beyond 1975, and ICPA elected to investigate other supplies such as purchasing power from other utilities and participating in proposed power development projects.

In 1973 representatives of ICPA and several California utilities agreed to study development of a large coal-fired steam generating plant in Utah. The outcome was the Intermountain Power Project which was formed with the filing of nonprofit corporation documents dated January 18, 1974.

The original participants and their relative allocations of IPP were:

	Percent Participation
ICPA	15.0
City of Anaheim (California)	15.0
City of Burbank (California)	2.5
City of Glendale (California)	2.5
City of Los Angeles (California)	50.0
City of Pasadena (California)	5.0
City of Riverside (California)	10.0

Amendments to the Interlocal Cooperation Act were passed by the Utah State Legislature in 1977. The Intermountain Power Agency (IPA), a subdivision of the State of Utah consisting of 23 municipal agencies within the State, was formed in accordance with this recently revised act. IPP will be owned by IPA, and energy output will be sold to each participant in accordance with individual power sales contracts. The amendments to the Interlocal Cooperation Act required that the output of a project, such as IPP, be offered to all utilities serving customers within the State. As a result of that activity, the participation of each utility as of September 28, 1978, is as follows:

Utility	Participation (%)	Plant Allocation (MW)
Beaver	0.333	9.99
Bountiful	1.375	41.25
Bridger Valley	0.230	6.90
Dixie-Escalante	1.000	30.00
Enterprise	0.133	3.99
Ephraim	0.330	9.90
Fairview	0.120	3.60
Fillmore	0.333	9.99
Flowell	0.200	6.00
Garkane	1.267	38.01
Heber	0.507	15.21
Holden	0.040	1.20
Hurricane	0.147	4.41
Hyrum	0.447	13.41
Kanosh	0.040	1.20
Kaysville	0.483	14.49
Lehi	0.430	12.90
Logan	2.000	60.00
Meadow	0.037	1.11
Monroe	0.130	3.90
Moon Lake	2.000	60.00
Morgan	0.190	5.70
Mt. Pleasant	0.233	6.99
Mt. Wheeler	1.167	35.01
Murray	3.334	100.02
Oak City	0.040	1.20
Parowan	0.237	7.11
Spring City	0.040	1.20
Price City	0.234	7.02

Utility	Participation (%)	Plant Allocation (MW) (continued)
Utah Power & Light	25.000	750.00
TOTAL - Utah	42.057	1261.71 MW
Los Angeles	34.084	1022.52
Anaheim	10.225	306.75
Burbank	1.704	51.12
Glendale	1.704	51.12
Pasadena	3.409	102.27
Riverside	6.817	204.51
TOTAL - California	57.943	1738.29 MW

ICPA, Utah Power & Light (UP&L) and the six California utilities with their relative participation and plant allocation can be summarized as shown below:

Utility	Percent Participation	Plant Allocation (MW)
ICPA* (Utah & Nevada)	17.057	511.71
UP&L	25.000	750.00
City of Anaheim	10.225	306.75
City of Burbank	1.704	51.12
City of Glendale	1.704	51.12
City of Los Angeles	34.084	1022.52
City of Pasadena	3.409	102.27
City of Riverside	6.817	204.51

*Excludes the city of St. George who is not participating in IPP.

The percent allocation includes Price City, Utah, who is not a member of ICPA.

The need for IPP's generating capacity is based on the load forecast which each participant has prepared for its own system. Each participant uses its own forecasting techniques and exercises judgment suitable to its service area's operation and circumstances. Table 1 is a summary of all participants' historic and projected peak demands from 1971 to 1995. Also shown on Table 1 is the percent average annual compound growth rate for each participant in the project. These forecasts reflect the anticipated conservation efforts and, among other factors, the effects of each utility's rate structure. However, uncertainties in forecasting exist no matter how much data is collected or how sophisticated the approaches used may be. The California Energy Commission has independently developed its own load forecasts for the California municipalities and has confirmed their need for IPP (Ref. Letter dated January 13, 1978 - Richard L. Maullin, Chairman, California Energy Commission, to Guy Martin, Assistant Secretary for Land and Water Resources, U.S. Department of Interior). From Table 1 it can be seen that the forecasted growth of noncoincident annual peak demands from 1985 to 1995 is 5029 megawatts, representing a combined average compound annual growth rate of 4.2 percent.

TABLE 1

Historic and Projected Growth in Peak Demand

Year	Anaheim	Burbank	Glendale	Los Angeles	Pasadena	Riverside	ICPA	UP&L	TOTAL	% Annual Increase	% Increase Over 1971
	Participants--Peak Demand in MW										
1971	206	183	167	3439	177	219	137	1076	5604	--	--
1972	212	192	168	3630	177	232	182	1183	5976	6.64	6.64
1973	286	187	175	3679	174	229	215	1327	6272	4.95	11.92
1974	305	174	165	3500	167	233	240	1391	6175	-1.57	10.19
1975	326	168	168	3594	169	229	266	1540	6460	4.62	15.27
1976	330	184	185	3809	181	249	300	1727	6780	4.95	20.98
1977	348	180	177	3778	175	253	326	1824	7061	4.14	26.00
1978	394	197	195	4144	193	278	355	2075	7831	10.90	39.74
1979	411	190	211	4016	201	269	377	2212	7887	0.72	40.73
1980	426	196	217	4157	209	282	400	2323	8210	4.10	46.50
1981	440	202	228	4259	217	296	421	2459	8522	3.80	52.07
1982	453	208	239	4366	225	310	452	2578	8831	3.62	57.58
1983	468	214	251	4488	232	325	480	2683	9141	3.51	63.12
1984	483	221	263	4618	240	340	510	2819	9494	3.86	69.41
1985	498	228	276	4772	248	355	539	2964	9880	4.06	76.30
1986	514	235	289	4923	256	370	574	3115	10276	4.01	83.37
1987	533	242	302	5077	264	386	611	3293	10708	4.20	91.08
1988	554	250	317	5230	271	403	650	3482	11157	4.19	99.09
1989	579	258	331	5383	279	420	692	3682	11624	4.19	107.42
1990	606	266	347	5537	287	439	736	3894	12112	4.20	116.13
1991	639	274	362	5691	295	459	784	4119	12623	4.22	125.25
1992	674	282	378	5846	302	479	835	4357	13153	4.20	134.71
1993	712	291	394	6003	310	501	890	4608	13709	4.23	144.63
1994	755	300	411	6163	318	524	949	4876	14296	4.28	155.10
1995	802	309	429	6325	326	547	1011	5160	14909	4.29	166.04
% Average Annual Growth Rate											
1971-1995	5.83	2.21	4.01	2.57	2.58	3.89	8.68	6.75	4.16		
1985-1995	4.88	3.09	4.51	2.86	2.77	4.42	6.49	5.70	4.20		

Table 2 has been included to indicate the existing resource capability and the purchased capacity of each participant. Without considering adequate reserve margins or new generating resources, it can be seen by comparing the total existing capability (Table 2) with the total peak demand (Table 1) that the participants will be capacity deficient beginning in 1986. The Cities of Anaheim and Riverside do not currently have any generating capacity and must purchase all of their capacity and energy requirements. ICPA, likewise, purchases its capacity and energy requirements except for 20 megawatts of existing capacity.

TABLE 2

CAPABILITY OF EXISTING RESOURCES (1979)

Participant	Capability (MW)	Capacity Purchases (MW)
ICPA	20	357
UP&L	2568	--
City of Anaheim	--	411
City of Burbank	267	--
City of Glendale	336	--
City of Los Angeles	5702	--
City of Pasadena	258	--
City of Riverside	--	269
TOTAL	9151	1037

Purpose and Need

IPP is needed to provide base-load capacity and energy to meet the projected load growth and reserve margin requirements for the service areas of ICPA, UP&L and participating California municipalities. IPP is also needed to reduce the dependency on foreign oil by retiring and reducing the use of older, less-efficient oil-fired generating facilities. IPP will provide a more diversified generation base utilizing several fuels so that the impact of the loss of any one type of fuel is minimized. Additionally, IPP is needed to achieve energy cost savings by providing a more efficient and economical energy source than other types of generation or higher cost purchased power.

Table 3 compares the participants' combined projected peak demand and generation capabilities with and without IPP.

IPP is scheduled to be available for commercial operation within the 1985-1990 time frame. For planning purposes, this is essentially the critical period for each of the participants. Consequently, the discussion in this section is based primarily on this period and beyond to 1995. Data information prior to 1985, with the exception of UP&L, is discussed in IPP's Preliminary Engineering and Feasibility Study (Volume V), titled "Environmental Assessment" and dated May, 1977. Similarly, information for UP&L is covered in their Environmental Impact Statement for the Hunter Plant (formerly Emery Plant) prepared by the Department of Interior (Emery DES 79-8).

TABLE 3

IPP PARTICIPANTS - RESERVE MARGIN COMPARISON
1985-1995

Year	Composite Peak Demand[1] (mw)	With IPP[2] Total Capability (mw)	With IPP[2] Reserve Margin (mw)	W/o IPP[2] Total Capability (mw)	W/o IPP[2] Reserve Margin (mw)
1985	9880	11252	1372	11252	1372
1986	10276	11845	1569	11099	823
1987	10708	12490	1782	10990	282
1988	11157	13651	2494	11401	244
1989	11624	14380	2756	11379	-245
1990	12112	14671	2559	11671	-441
1991	12623	15107	2484	12107	-516
1992	13153	15155	2002	12155	-998
1993	13709	15844	2135	12844	-865
1994	14296	16318	2022	13318	-978
1995	14909	16883	1974	13883	-1026

1. Non-coincident peak demand.

2. Total resources include existing resources minus retirements plus future generation resources.

The participants are involved in several other generating projects as listed in Table 4.

TABLE 4

PARTICIPATION IN OTHER GENERATING PROJECTS

Project	Type	Participants Involved	Planned Commercial Operation Date
Coronado 1	Coal	LADWP	9/79
Coronado 2	Coal	LADWP	10/80
San Onofre 2	Nuclear	Anaheim, Riverside	10/80
San Onofre 3	Nuclear	Anaheim, Riverside	1/82
Hunter 2	Coal	UP&L	6/80
Hunter 3	Coal	UP&L	6/83
Hunter 4	Coal	UP&L	6/85
Scattergood 3[1)]	Oil	LADWP	6/84
Palo Verde 4	Nuclear	LADWP, Anaheim, Burbank Glendale, Pasadena, Riverside	5/88
Palo Verde 5	Nuclear	LADWP, Anaheim, Burbank, Glendale, Pasadena, Riverside	5/90
Wellington 1	Coal	UP&L	6/88

[1)] Conversion of an existing natural gas unit to oil-burning capability.

All of these projects are included in the capabilities listed in Table 3. Of these projects, only Coronado, San Onofre and Hunter 2 are under construction. All others are in various stages of planning and subject to the uncertainties of regulatory approval.

All of the California participants were involved in the Sundesert and San Joaquin Nuclear Projects, both of which were cancelled in 1978. Deletion of these facilities from the participants' resource plans reduced their total resources and reserve margins in the 1985-1995 time frame and later years.

Each participant's load forecast forms the basis upon which decisions regarding the acquisisiton of additional system capability are made. Since there is no uniform criteria developed for the combined area, each participant is responsible for determining its own criteria for bulk generation planning, including the methodology for load forecasting.

System capabilities for each of IPP's participants for the 11-year 1985-1995 period are presented later with the discussion for each individual participant.

To supply reliable electric service, sufficient generating capacity must be planned to provide adequate reserve margins. The reserve margin is the difference between the total anticipated generating resources and the expected peak demand. The reserve margins provide additional gener-

ating resources for unplanned outages of essential generating facilities. Additionally, an adequate reserve margin provides the flexibility for maintaining reliable system operation when:

1. Scheduled maintenance removes generating facilities from service for periods of time from several days to several months.

2. Actual customer demand may be higher than forecasted.

3. A future year may have less than average water conditions, thereby reducing the capacity of system hydroelectric resources.

4. New generating units may not be completed on schedule.

5. Critical transmission lines may be forced out of service, reducing the amount of electric capacity available to the system.

One consequence of having low-capacity reserve margins is that customers may suffer more frequent service interruptions because of an insufficient power supply. Power supply interruptions generally affect a larger number of customers than do local distribution line outages. Power outages, regardless of cause, can result in adverse impacts on public health and safety, economic losses and personal inconvenience. The extent of these impacts vary according to the severity and duration of the outage.

Each participant is responsible for establishing and maintaining its own reserves, and therefore the reserve criteria will vary for each participant. Generally, one or more of the following three criteria are employed by the participants to determine required reserve margins:

1. Probability criterion - The probability criterion requires that the reserve margin, after allowing for scheduled maintenance, be sufficient so that random combined system forced outages of generating facilities will not exceed the available reserve capacity more often than some value that has been established as reasonable based on experience and judgment. Typically, this value is one day every ten years.

2. Contingency criterion - The contingency criterion generally requires that the reserve margin, after allowing for scheduled maintenance, be greater than the combined capacity of the largest risks (generating unit or transmission line).

3. Percentage criterion - The percentage criterion requires that the reserve margin, after allowance for scheduled maintenance, be greater than some predetermined percent of the estimated peak load. This percentage is usually 15 to 20 percent.

For each of the participants, IPP respresents an important compo-

nent of its resource program. IPP generation is needed for each to accomplish one or more of the following purposes:

1. *Satisfy load growth and reserve margin requirements.*
2. *Reduce system use of oil as a boiler fuel.*
3. *Provide a resource of economical base-load energy.*
4. *Provide a more diversified generation base.*
5. *Permit retirement of older, less-efficient units.*
6. *Provide an alternative to higher cost purchased power.*

In the following, the applicability of the preceding purposes is identified for each participating utility and the effects on each system of not developing IPP are discussed.

Anaheim and Riverside

The electrical facilities within Anaheim and Riverside are owned and operated by each City's municipal electrical system; however, neither City at present owns any generating resources. Each City presently purchases its total energy requirements from Southern California Edison Company (SCE) and Nevada Power Company (NPC) under wholesale rates and contracts filed with the Federal Energy Regulatory Commission.

Anaheim and Riverside are participating in IPP in order to provide resources to meet their growing loads and to obtain lower cost electrical power for their customers. Wholesale power rates are presently higher than the cost of energy from alternate sources and are currently higher than the rate for comparable industrial retail customers served by SCE.

Both Anaheim and Riverside have agreements with SCE providing that the utilities will integrate their resources in order to meet the load of the control area which includes the loads of SCE, Anaheim and Riverside. Thus, if Anaheim and/or Riverside provides a resource to meet part of its load, then SCE will not have to provide resources to meet that same load.

Anaheim's load forecast is based on the results of an econometric model which includes temperature- and nontemperature-sensitive demand components. Furthermore, the forecast has been adjusted to compensate for conservation estimates. The system's projected load growth within the period of 1985-1995 is summarized in Table 5. The peak demand is projected to increase at an average annual compound rate of 4.9 percent within this time frame.

TABLE 5

ANAHEIM - RESERVE MARGIN COMPARISON
1985-1995

		Total Resources with IPP[1]			Total Resources w/o IPP[1]		
	Peak Demand	Capability	Reserve Margin (2)		Capability	Reserve Margin (2)	
Year	(mw)	(mw)	(mw)	(%)	(mw)	(mw)	(%)
1985	498	84	--	--	84	--	--
1986	514	161	--	--	84	--	--
1987	533	238	--	--	84	--	--
1988	554	232	--	--	102	--	--
1989	579	409	--	--	102	--	--
1990	606	428	--	--	121	--	--
1991	639	428	--	--	121	--	--
1992	674	428	--	--	121	--	--
1993	712	428	--	--	121	--	--
1994	755	428	--	--	121	--	--
1995	802	428	--	--	121	--	--

1. Total resources include existing resources plus future generation resources.

2. Because all deficient power is purchased on a contractual basis, reserve margin values are not applicable.

Table 6 summarizes Riverside's projected annual load growth from 1985 to 1995. This forecast reflects the impact of the City's conservation program and the effects of escalating costs of elecrical energy. The peak demand average annual compound growth rate for the 1985-1995 time frame is estimated to be 4.4 percent.

Burbank

The City of Burbank is participating in IPP in order to obtain an economical source of base-load power to meet load growth requirements with an adequate reserve margin and to reduce system dependence on oil as a boiler fuel.

In assessing capability requirements necessary to ensure reliable service, Burbank requires a minimum reserve margin of 58 megawatts, equal to Burbank's single largest contingency. Without IPP, system capability would not be sufficient to meet reserve requirements in the 1985-1995 period as shown in Table 7.

Burbank's load forecast is consistent with the California Energy Commission's (CEC) adopted Common Forecasting Methodology as published in their 1977 Biennial Report (Volume 2). The forecast is based on extrapolation of past trends and modified by judgment. Allowance is made for recent conservation activities and related legislation, price effects, population changes, expected economic activity and changing social conditions. The net result of this analysis of Burbank's future need is to project a 3.1-percent average annual compound peak demand growth rate for the 1985-1995 period.

TABLE 6

RIVERSIDE - RESERVE MARGIN COMPARISON
1985-1995

Year	Peak Demand (mw)	Total Resources with IPP[1] Capability (mw)	Reserve Margin[2] (mw)	Reserve Margin[2] (%)	Total Resources w/o IPP[1] Capability (mw)	Reserve Margin[2] (mw)	Reserve Margin[2] (%)
1985	355	40	--	--	40	--	--
1986	370	91	--	--	40	--	--
1987	386	142	--	--	40	--	--
1988	403	206	--	--	53	--	--
1989	420	257	--	--	53	--	--
1990	439	270	--	--	66	--	--
1991	459	270	--	--	66	--	--
1992	479	270	--	--	66	--	--
1993	501	270	--	--	66	--	--
1994	524	270	--	--	66	--	--
1995	547	270	--	--	66	--	--

1. Total resources include existing resources plus future generation resources.

2. Because all deficient power is purchased on a contractual basis, reserve margin values are not applicable.

TABLE 7

BURBANK - RESERVE MARGIN COMPARISON
1985-1995

		Total Resources with IPP[1]			Total Resources w/o IPP[1]		
	Peak		Reserve			Reserve	
	Demand	Capability	Margin		Capability	Margin	
Year	(mw)	(mw)	(mw)	(%)	(mw)	(mw)	(%)
1985	228	247	19	8.3	247	19	8.3
1986	235	259	24	10.2	247	12	5.1
1987	242	272	30	12.4	247	5	2.1
1988	250	269	19	7.6	231	-19	-7.6
1989	258	315	57	22.1	264	6	2.3
1990	266	364	98	36.8	313	47	17.7
1991	274	360	86	31.4	309	35	12.8
1992	282	363	81	28.7	312	30	10.6
1993	291	362	71	24.4	311	20	6.9
1994	300	368	68	22.7	317	17	5.7
1995	309	370	61	19.7	319	10	3.2

1. Total resources include existing resources minus retirements plus future generation resources.

Glendale

The City of Glendale is participating in IPP in order to minimize its capacity deficiency and to secure generating capacity to meet load growth requirements. IPP will provide base-load energy at costs below those of the City's existing oil-fired units and will provide better system fuel diversification. Hence, reliability will be improved and retirement of the least efficient on-line units will be made possible. Glendale's generation reserve margin criterion is 15 percent of the system peak demand or the single largest contingency, whichever is greater. At the present, Glendale's single largest contingency is 65 megawatts. Delays and cancellations that have already occurred in scheduling IPP and other projects can have serious consequences for the City of Glendale in providing reliable electric service to its customers in the future. For example, as indicated in Table 8, system capability will fall below peak demand beginning in 1987. Even if Glendale's scheduled plans for retiring its least efficient generating unit (Grayson 3, 21 mw, in 1988) were postponed, it would still not be sufficient to compensate for power which IPP would produce. Continued reliance upon older, less-efficient oil-fired units now scheduled for retirement or reduced usage will result in higher system economic costs, increased oil consumption and decreased reliability.

Glendale's load forecast was developed by utilizing econometric models to forecast sales by customer class, system base and peak demand. An adjustment to these projections was made to account for nonprice-induced conservation, using the estimated savings resulting from such actions as improving appliance efficiency standards, upgrading building codes to require more energy-efficient designs and promoting the sale of energy-conserving devices. Electrical peak demand is projected to increase at an average annual compound rate of approximately 4.5 percent within the 1985-1995 time frame.

ICPA

ICPA is participating in IPP in order to obtain power at costs below those associated with reliance on purchased power. By participating in IPP, ICPA will have an opportunity to significantly increase its own generation base.

At present, ICPA's generation reserve margin criterion is 20 percent of its annual peak. Table 9 shows that without IPP, a continual deficiency of capacity will be experienced starting in 1986.

The ICPA load forecast was made by estimating separately the loads of each of their members which are presently included in IPP's power purchasing agreement. The projected annual peak demand for the period 1985-1995 is estimated to have an average annual compound growth rate of 6.5 percent.

Los Angeles

IPP is an integral part of LADWP's resource program and will contribute to the accomplishment of several objectives; meeting load growth and reserve margin requirements; reducing system dependence on oil-fired generation and permitting retirement of obsolete generating units.

TABLE 8

GLENDALE - RESERVE MARGIN COMPARISON
1985-1995

		Total Resources with IPP[1]			Total Resources w/o IPP[1]		
Year	Peak Demand (mw)	Capability (mw)	Reserve Margin (mw)	Reserve Margin (%)	Capability (mw)	Reserve Margin (mw)	Reserve Margin (%)
1985	276	336	60	21.7	336	60	21.7
1986	289	348	59	20.4	336	47	16.3
1987	302	293	- 9	- 3.0	268	-34	-11.2
1988	317	297	-20	- 6.3	259	-58	-18.3
1989	331	310	-21	- 6.3	259	-51	-15.4
1990	347	321	-26	- 7.5	270	-77	-22.2
1991	362	321	-41	-11.3	270	-92	-25.4
1992	378	321	-57	-15.1	270	-108	-28.6
1993	394	321	-73	-18.5	270	-124	-31.5
1994	411	321	-90	-21.9	270	-141	-34.3
1995	429	321	-108	-25.2	270	-159	-37.1

1. Total resources include existing resources minus retirements plus future generation resources.

LADWP utilizes the probability criterion to determine minimum system reserve requirements for planning purposes. The criterion used by LADWP is that the probability of losing load should not exceed one day in ten years. This probability is commonly used in the utility industry to provide a reasonable level of reliability. This level of reliability is also recommended by the Western Systems Coordinating Council (WSCC).

WSCC is the largest geographically of nine regional electric utility reliability councils in the United States, containing 46 member systems and 13 affiliates in the 14 western states and British Columbia. The overall goal of WSCC is to assure the reliability of the bulk power system in the region through coordination of the planning and operation of electric generation and interconnected transmission facilities. As a result, the interconnected system has successfully withstood disturbances considerably more severe than the one which caused the Northeast Blackout in November 1965.

The importance of IPP generation in relation to LADWP's load and reserve requirements is indicated in Tables 10, 10A and 10B. IPP is one of three major power projects currently being planned by LADWP. Until a project is firmly committed to construction, there is no assurance that proposed generating capacity will be available as scheduled. For example, San Joaquin and Sundesert Nuclear Projects have been recently cancelled and are no longer part of LADWP's resource plan. Table 10A illustrates LADWP's reserves when none of the proposed projects which are not already committed to construction are included. Even with IPP, the reserve requirement for this period of time leaves LADWP with deficient reserve capacity. Furthermore, in Table 10B which includes LADWP's resources committed to construction and proposed projects, without IPP a deficiency of required reserves occurs in 1986 and beyond. When Sundesert and San Joaquin were cancelled, LADWP delayed the retirement of 398 mw of oil-fired generation to the mid-1990's at which time those units will be 50 years old. However, LADWP plans to retire these units in the late 1980's if any of several generation additions presently being studied become viable projects for the early 1990's. Retirement of those units will tend to levelize the excess reserves for LADWP in the 1985-1995 period.

LADWP's load forecast is based on estimates of the City's future annual energy requirements for various customer categories. The forecast takes into consideration such factors as conservation, load management, population, personal income, Gross State Product and price of electricity. The peak demand forecast summarized for the period 1985-1995 in Table 10 is based on LADWP's current demand forecast, dated March 1, 1978. These values are slightly lower than those developed by the CEC as published in their 1977 Biennial Report (Volume 2). However, given the uncertainty inherent in both forecasts, they are not substantially different. For example, in 1990 the adopted or "most likely" CEC forecast shows a peak demand to be 5754 megawatts compared with LADWP's peak demand of 5537 megawatts. The LADWP average annual compound load growth for the period 1985-1995 is projected to be approximately 2.9 percent.

PASADENA

The City of Pasadena is participating in IPP in order to meet future load growth requirements, reduce its dependency on oil-fired generation, obtain lower cost base-load energy and retire several older, less-efficient units.

TABLE 9

ICPA - RESERVE MARGIN COMPARISON
1985-1995

Year	Peak Demand (mw)	Total Resources with IPP(1) Capability (mw)	Reserve Margin (mw)	Reserve Margin (%)	Total Resources w/o IPP(1) Capability (mw)	Reserve Margin (mw)	Reserve Margin (%)
1985	539	607	68	12.6	607	68	12.6
1986	574	559	-15	-2.6	433	-144	-24.6
1987	611	688	77	12.6	432	-179	-29.3
1988	650	816	166	25.5	432	-218	-33.5
1989	692	944	252	36.4	432	-260	-37.6
1990	736	944	208	28.3	432	-304	-41.3
1991	784	944	160	20.4	432	-352	-44.9
1992	835	944	109	13.1	432	-403	-48.3
1993	890	944	54	6.1	432	-458	-51.5
1994	949	944	-5	-0.5	432	-517	-54.5
1995	1011	944	-67	-6.6	432	-579	-57.3

1. Total resources include existing resources minus retirements plus future generation resources.

TABLE 10

LOS ANGELES - RESERVE MARGIN COMPARISON
1985-1995

		Total Resources with IPP(2)			Total Resources w/o IPP(2)		
	Peak Demand(1)	Capability	Reserve Margin		Capability	Reserve Margin	
Year	(mw)	(mw)	(mw)	(%)	(mw)	(mw)	(%)
1985	4772	6094	1322	27.7	6094	1322	27.7
1986	4923	6346	1423	28.9	6090	1167	23.7
1987	5077	6592	1515	29.8	6080	1003	19.8
1988	5230	6986	1756	33.6	6218	988	18.9
1989	5383	7232	1849	34.3	6208	825	15.3
1990	5537	7370	1833	33.1	6346	809	14.6
1991	5691	7360	1669	29.3	6336	645	11.3
1992	5846	7350	1504	25.7	6326	480	8.2
1993	6003	7640	1637	27.3	6616	613	10.2
1994	6163	7858	1695	27.5	6834	671	10.9
1995	6325	8081	1756	27.8	7057	732	11.6

1. Peak demand includes demand from sales and firm transfers on peak.

2. Total resources include existing resources minus retirements plus future generation resources.

TABLE 10A

LOS ANGELES - REQUIRED RESERVES SUMMARY
(INCLUDES ONLY RESOURCES COMMITTED TO CONSTRUCTION)

Year	Required Reserves (mw)*	Excess Reserves With IPP (mw)	Excess Reserves w/o IPP (mw)
1985	1210	-348	-348
1986	1208	-245	-501
1987	1308	-253	-765
1988	1392	-244	-1012
1989	1493	-252	-1276
1990	1557	-480	-1504
1991	1552	-639	-1663
1992	1529	-781	-1805
1993	1597	-716	-1740
1994	1655	-716	-1740
1995	1701	-701	-1725

*Based on LADWP's loss-of-load criterion of one day in ten years.

TABLE 10B

LOS ANGELES - REQUIRED RESERVES SUMMARY

(INCLUDES PROPOSED RESOURCES AND RESOURCES COMMITTED TO CONSTRUCTION)

Year	Required Reserves (mw)*	Excess Reserves With IPP (mw)	Excess Reserves w/o IPP (mw)
1985	1210	112	112
1986	1208	215	-41
1987	1308	207	-305
1988	1392	364	-404
1989	1493	356	-668
1990	1557	276	-748
1991	1552	117	-907
1992	1529	-25	-1049
1993	1597	40	-984
1994	1655	40	-984
1995	1701	55	-969

*Based on LADWP's loss-of-load criterion of one day in ten years.

Pasadena's generation reserve margin criterion is 15 percent of the system peak demand or the single largest contingency, whichever is greater. Pasadena's single largest contingency is 71 mw. Without IPP, capacity reserves during the late 1980's will prove to be inadequate to cover Pasadena's largest contingency as shown in Table 11. Therefore, deferral of unit retirements well beyond their effective operating life will be necessary to maintain adequate reserve margins.

Pasadena's load projections are based on the CEC's adopted Common Forecasting Methodology as published in the 1977 Biennial Report (Volume 2). These projections include conservation and pricing effects as well as the geographic, demographic and economic characteristics of Pasadena's service area. The average annual compound peak demand growth rate for the 1985-1995 period is approximately 2.8 percent.

UP&L

UP&L is participating in IPP in order to meet its projected load growth. The reserve margin criterion for UP&L is based on maintaining a reserve margin of at least 20 percent of its peak demand. Without IPP, UP&L's required reserve margin would be deficient in 1986. The reserve margins with and without IPP are shown in Table 12.

UP&L's forecast of load through 1986 was submitted to the Utah Public Service Commission at the time of application for approval to construct Hunter (formerly Emery) #3 and #4 units. The Utah Public Service Commission, in its Report and Order for Case No. 78-035-03, authorized a Certificate of Convenience and Necessity for Hunter #3 and #4 units, indicating its concurrence with UP&L's load forecast. For the 1985-1995 period, the peak demand is expected to increase at an average annual compound rate of 5.7 percent.

TABLE 11

PASADENA - RESERVE MARGIN COMPARISON
1985-1995

		Total Resources with IPP[1]			Total Resources w/o IPP[1]		
	Peak Demand	Capability	Reserve Margin		Capability	Reserve Margin	
Year	(mw)	(mw)	(mw)	(%)	(mw)	(mw)	(%)
1985	248	314	66	26.6	314	66	26.6
1986	256	339	83	32.4	314	58	22.6
1987	264	335	71	26.9	284	20	7.6
1988	271	327	56	20.7	251	- 20	-7.4
1989	279	308	29	9.4	206	- 73	-26.2
1990	287	320	33	10.3	218	- 69	-24.0
1991	295	320	25	7.8	218	- 77	-26.1
1992	302	275	-27	-8.9	173	-129	-42.7
1993	310	275	-35	-11.3	173	-137	-44.2
1994	318	275	-43	-13.5	173	-145	-45.6
1995	326	275	-51	-15.6	173	-153	-46.9

1. Total resources include existing resources minus retirements plus future generation resources.

TABLE 12

UP&L - RESERVE MARGIN COMPARISON
1985-1995

		Total Resources with IPP[1]			Total Resources w/o IPP[1]		
	Peak Demand	Capability	Reserve Margin		Capability	Reserve Margin	
Year	(mw)	(mw)	(mw)	(%)	(mw)	(mw)	(%)
1985	2964	3530	566	19.1	3530	566	19.1
1986	3115	3742	627	20.1	3555	440	14.1
1987	3293	3930	637	19.3	3555	262	8.0
1988	3482	4417	935	26.8	3855	373	10.7
1989	3682	4605	923	25.1	3855	173	4.7
1990	3894	4655	761	19.5	3905	11	0.3
1991	4119	5105	986	23.9	4355	236	5.7
1992	4357	5205	848	19.5	4455	98	2.2
1993	4608	5605	997	21.6	4855	247	5.4
1994	4876	5855	979	20.1	5105	229	5.7
1995	5160	6195	1035	20.1	5445	285	5.5

1. Total resources include existing resources minus retirements plus future generation resources.

CONCLUSIONS

The primary purpose of IPP is to meet load growth, especially within the 1986-1988 time frame, while maintaining satisfactory reserve margins to comply with reliability criteria. Without IPP generation, total system capability would fall below the composite (noncoincidental) annual peak demand beginning in 1989 (Table 3).

Currently, most of the Southern California participants (specifically, Burbank; Glendale; Los Angeles and Pasadena) must rely heavily upon generating units burning oil to serve system loads. IPP will enable these utilities to reduce this reliance with a more economic fuel consumption.

IPP will provide all participants with a reliable source of economic base-load energy.

The capacity provided by IPP will help toward retiring some older, less-efficient oil-burning units in the Los Angeles Basin that will have been in operation for over 35 years.

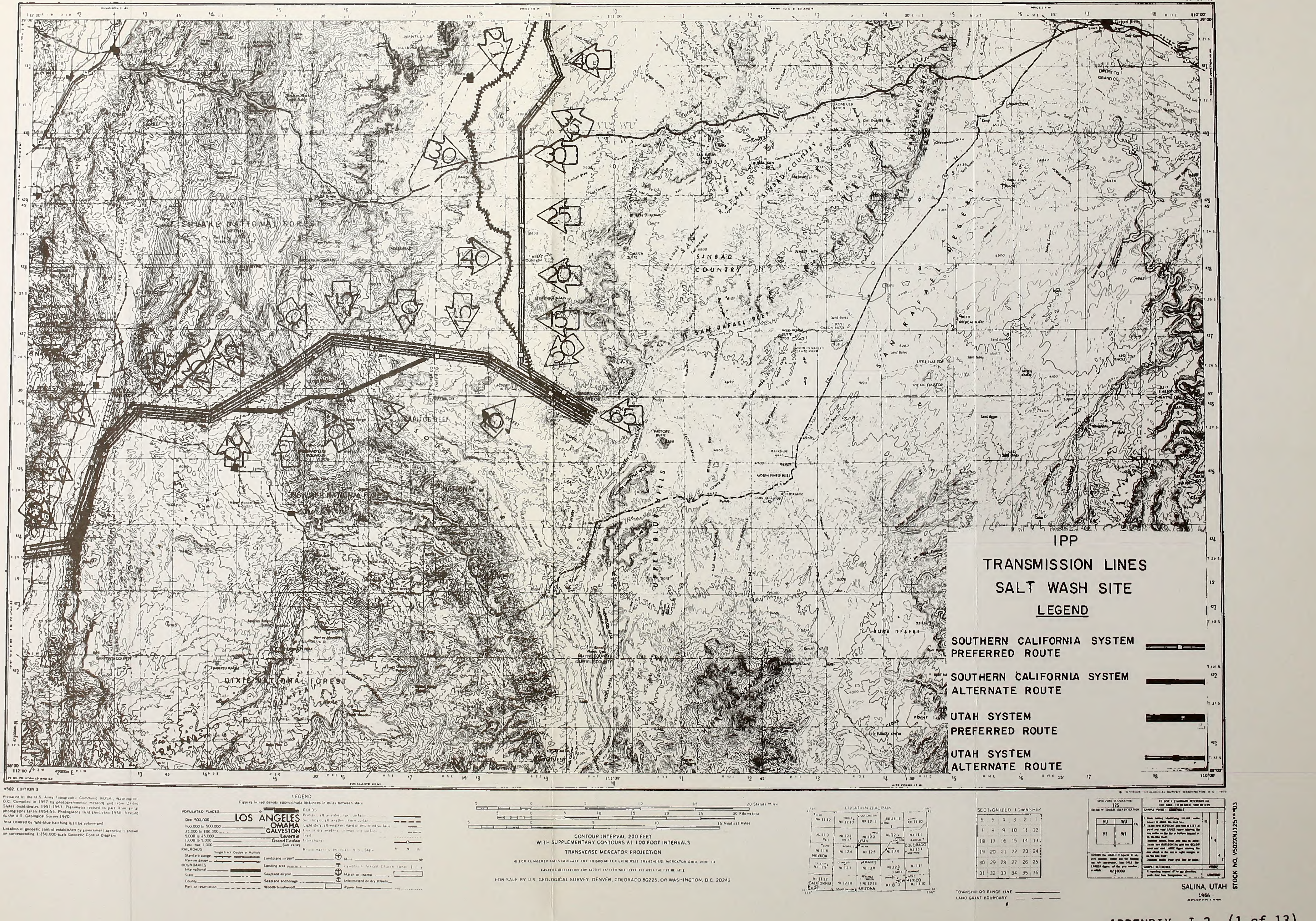
Appendix I-2

Coal Trace Element Analysis

Trace Element	Range p/m
Antimony	0.0 to 0.5
Arsenic	0.2 to 3.0
Barium	6.0 to 130.0
Beryllium	0.3 to 6.0
Boron	38.0 to 190.0
Bromine	0.0 to 2.0
Cerium	5.0 to 32.0
Cesium	0.1 to 0.3
Chromium	8.0 to 26.0
Cobalt	2.0 to 14.0
Copper	11.0 to 15.0
Europium	0.0 to 0.6
Fluorine	71.0 to 570.0
Gallium	2.0 to 18.0
Germanium	0.0 to 3.0
Lanthanium	4.0 to 39.0
Lead	1.0 to 7.0
Lithium	3.0 to 180.0
Manganese	5.0 to 64.0
Mercury	0.03 to 0.21
Molybdenum	8.0 to 28.0
Neodymium	0.4 to 2.0
Nickel	2.0 to 20.0
Niobium	0.9 to 6.0
Praesdymium	0.2 to 1.0
Rubidium	0.2 to 9.0
Samarium	0.0 to 0.9
Scandium	8.0 to 26.0
Selenium	0.0 to 1.0
Strontium	21.0 to 230.0
Thorium	0.0 to 7.0
Tin	0.0 to 0.8
Uranium	0.0 to 7.0
Vandium	4.0 to 24.0
Yttrium	4.0 to 37.0
Zinc	6.0 to 44.0
Zirconium	11.0 to 43.0

The following Trace Elements and their concentrations were found to be less than 0.3 p/m:

Bismuth	Iodine	Silver
Cadmium	Iridium	Tantalium
Dysprosium	Lutecium	Terbium
Erbium	Osmium	Telluvium
Gadolinium	Palladium	Thallium
Gold	Platinium	Tungsten
Hafnium	Phenium	Yherbium
Holmium	Rhodium	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UTAH SYSTEM ALTERNATE ROUTE
SINBAD COUNTRY
SAN RAFAEL REEF
CAPITOL REEF
DIXIE NATIONAL FOREST
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OMAHA
GALVESTON
SECTIONIZED TOWNSHIP
SALINA, UTAH
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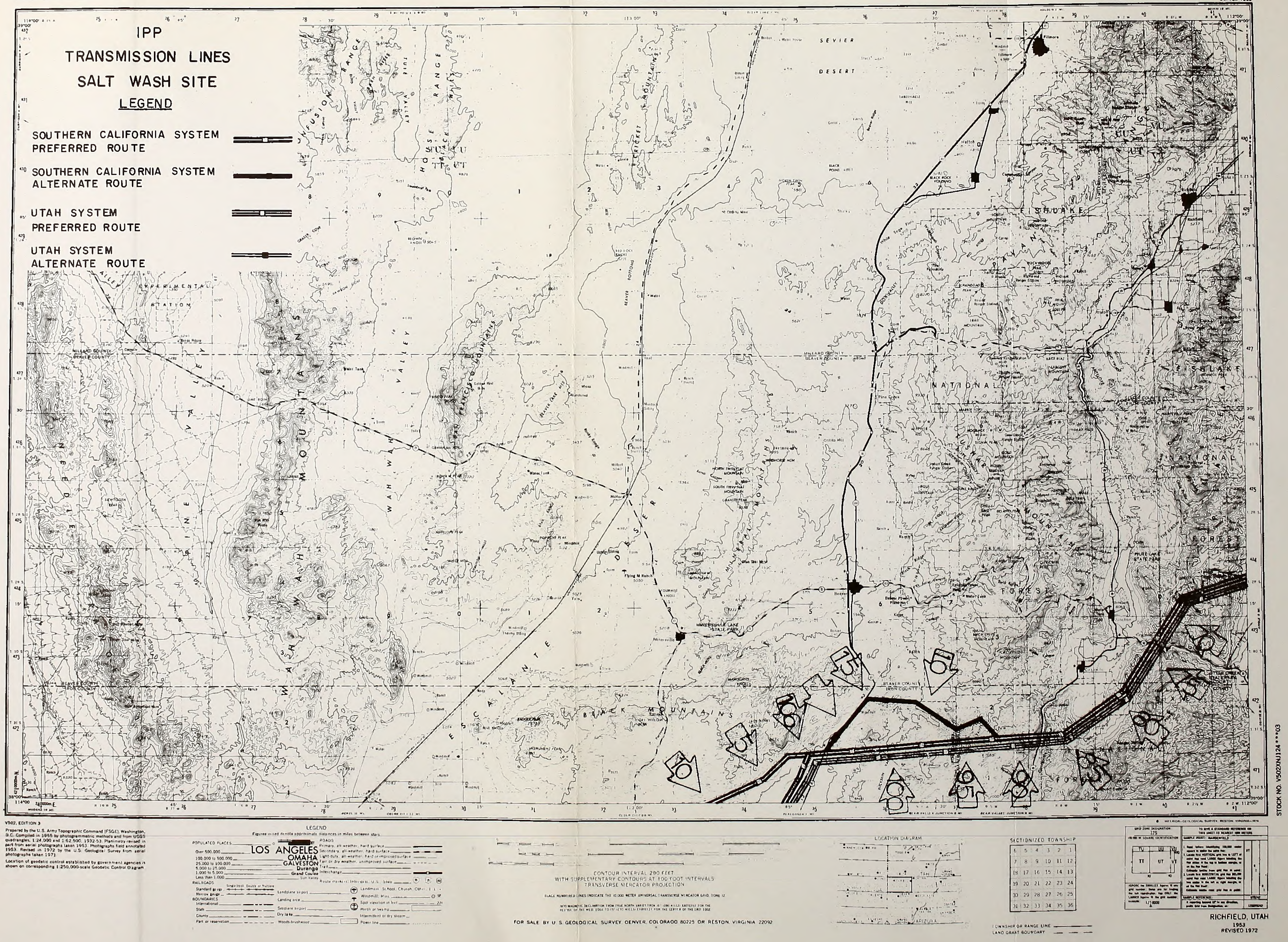
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WAH WAH MOUNTAINS
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PINE VALLEY
ESCALANTE DESERT
BLACK MOUNTAINS
NATIONAL FOREST
MILLARD COUNTY
BEAVER COUNTY
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GALVESTON
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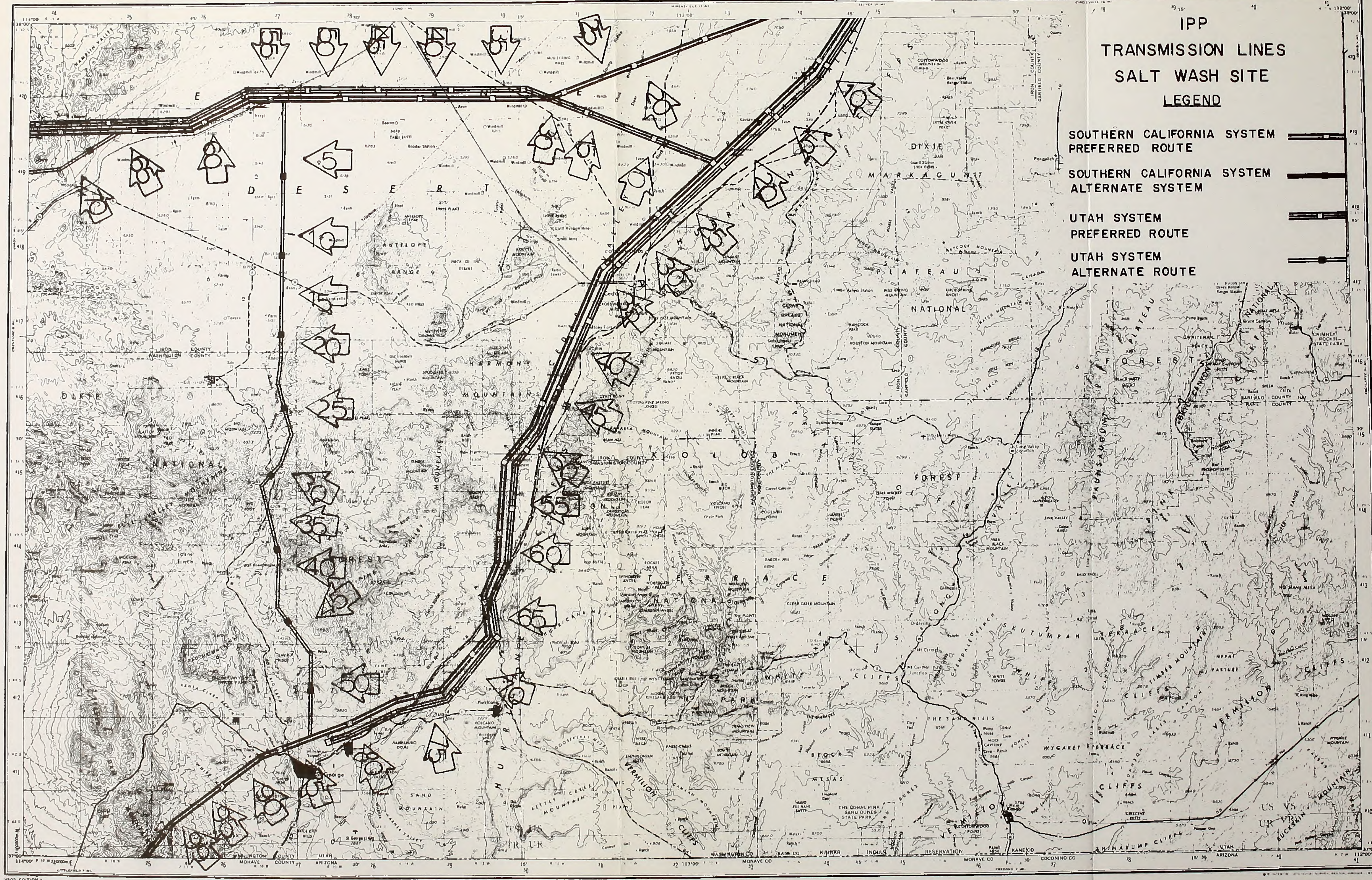

V502, EDITION 3

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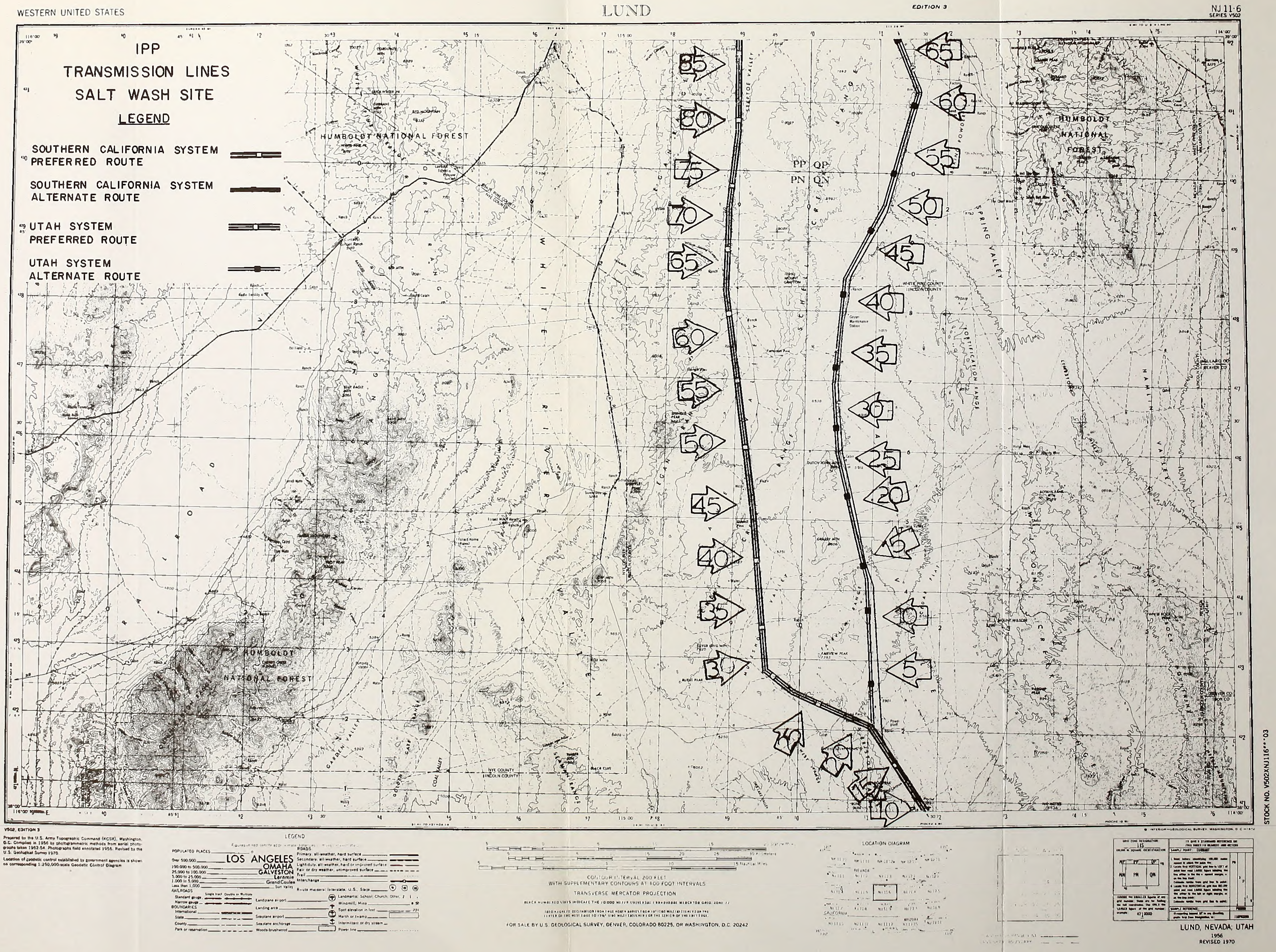
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WHITE RIVER VALLEY
SPRING VALLEY
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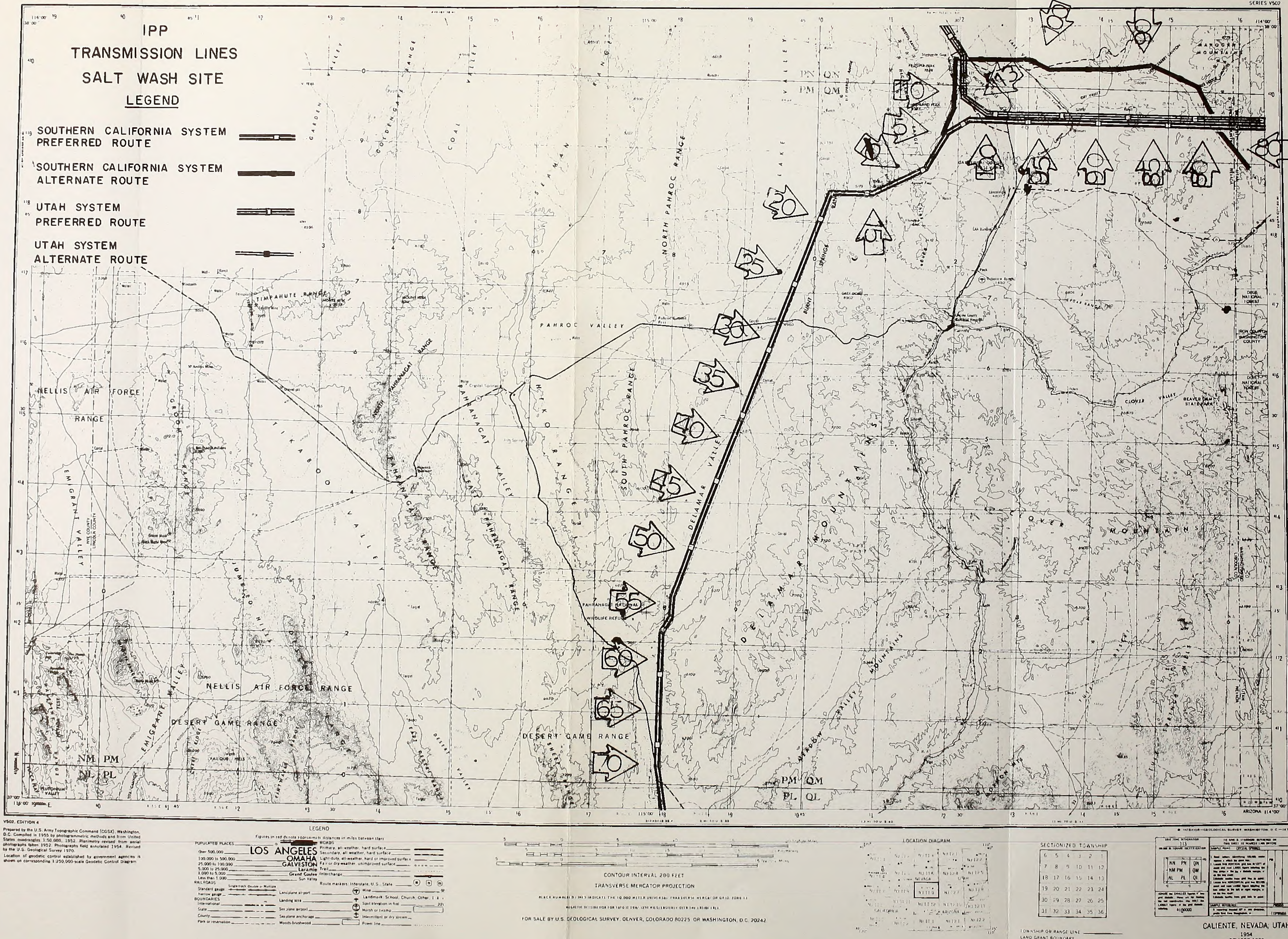
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SOUTH PAHROC RANGE
DELAMAR VALLEY
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NELLIS AIR FORCE RANGE
DESERT GAME RANGE
TIMPAHUTE RANGE
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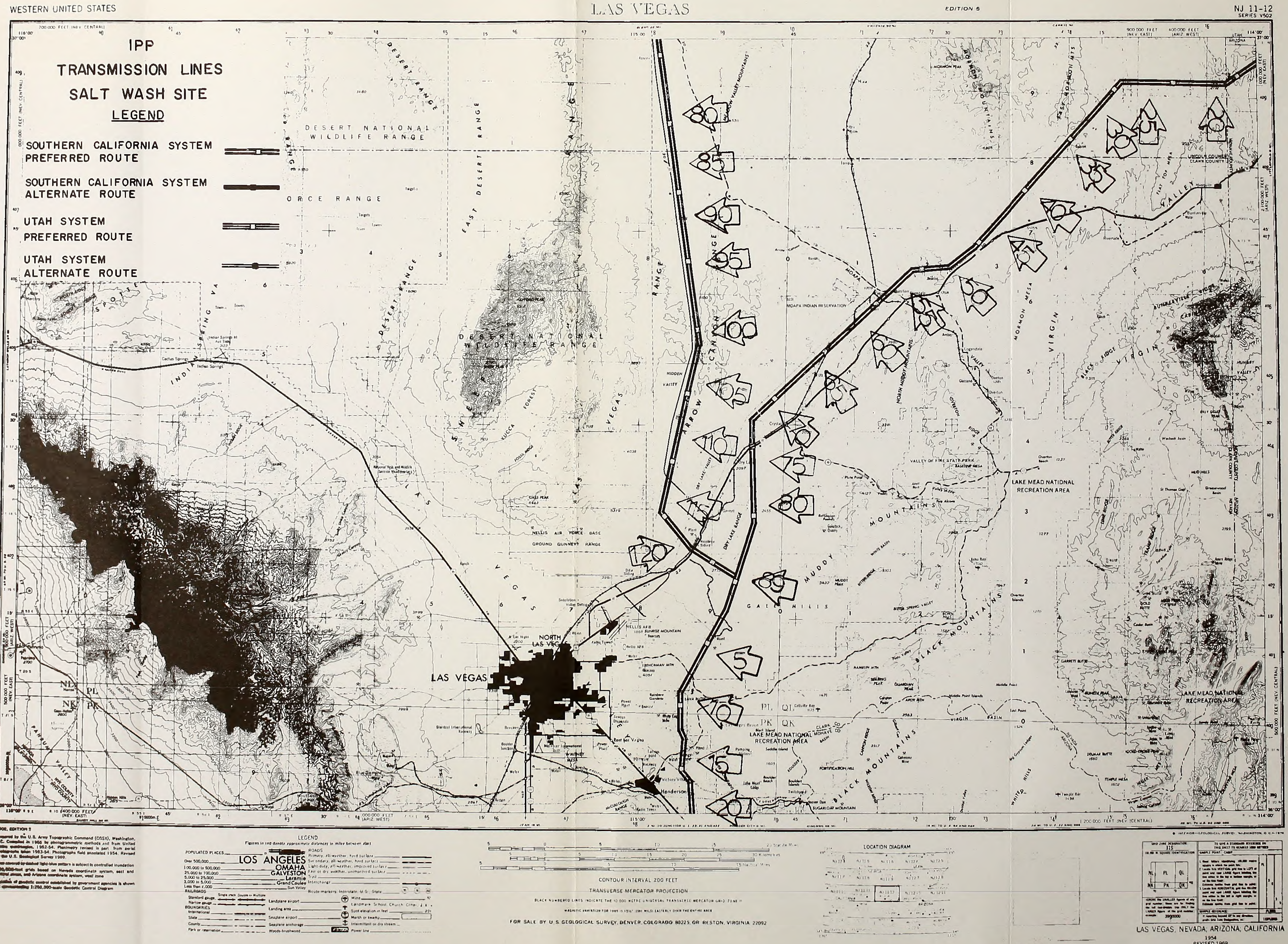
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LAS VEGAS
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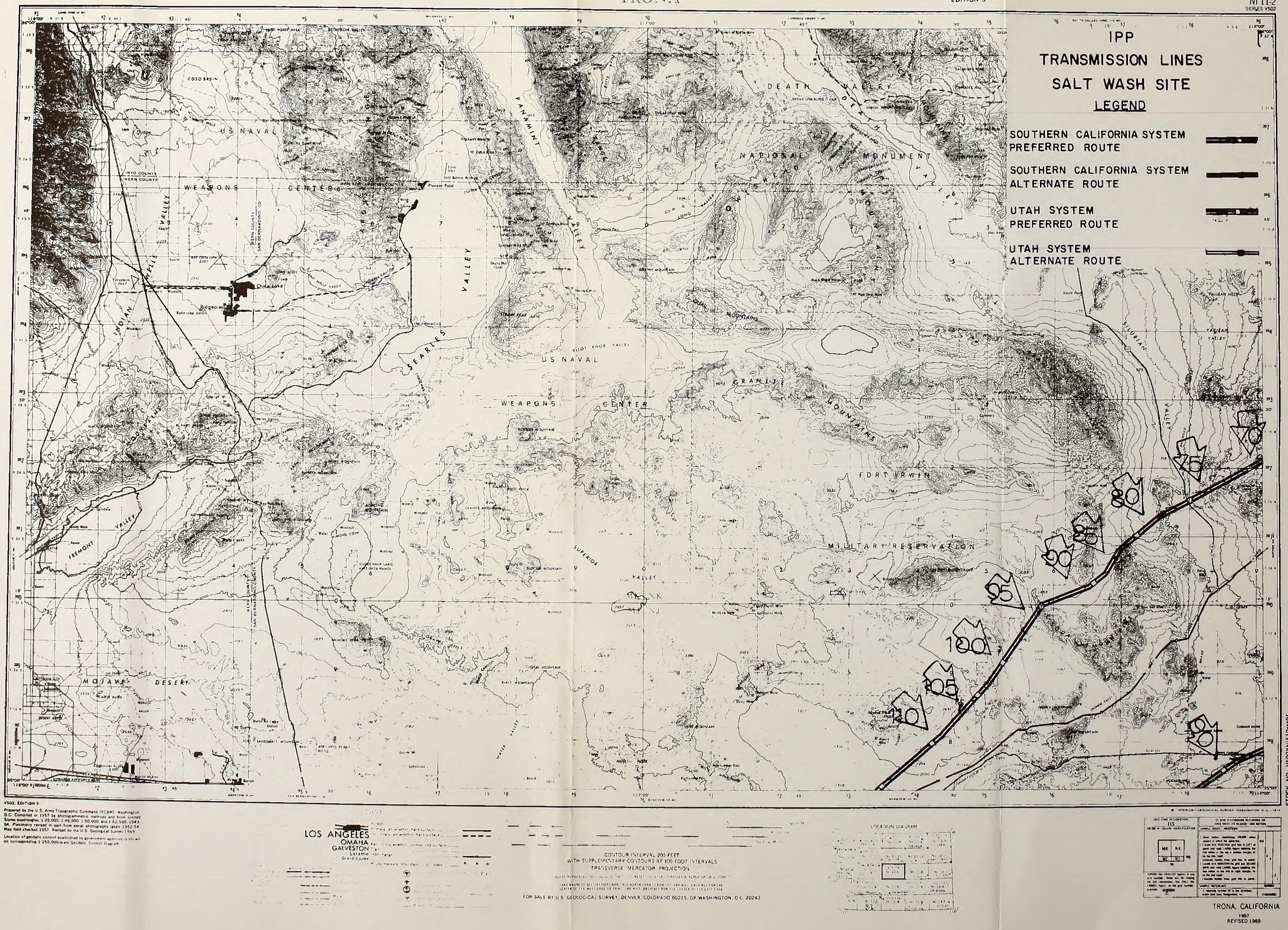
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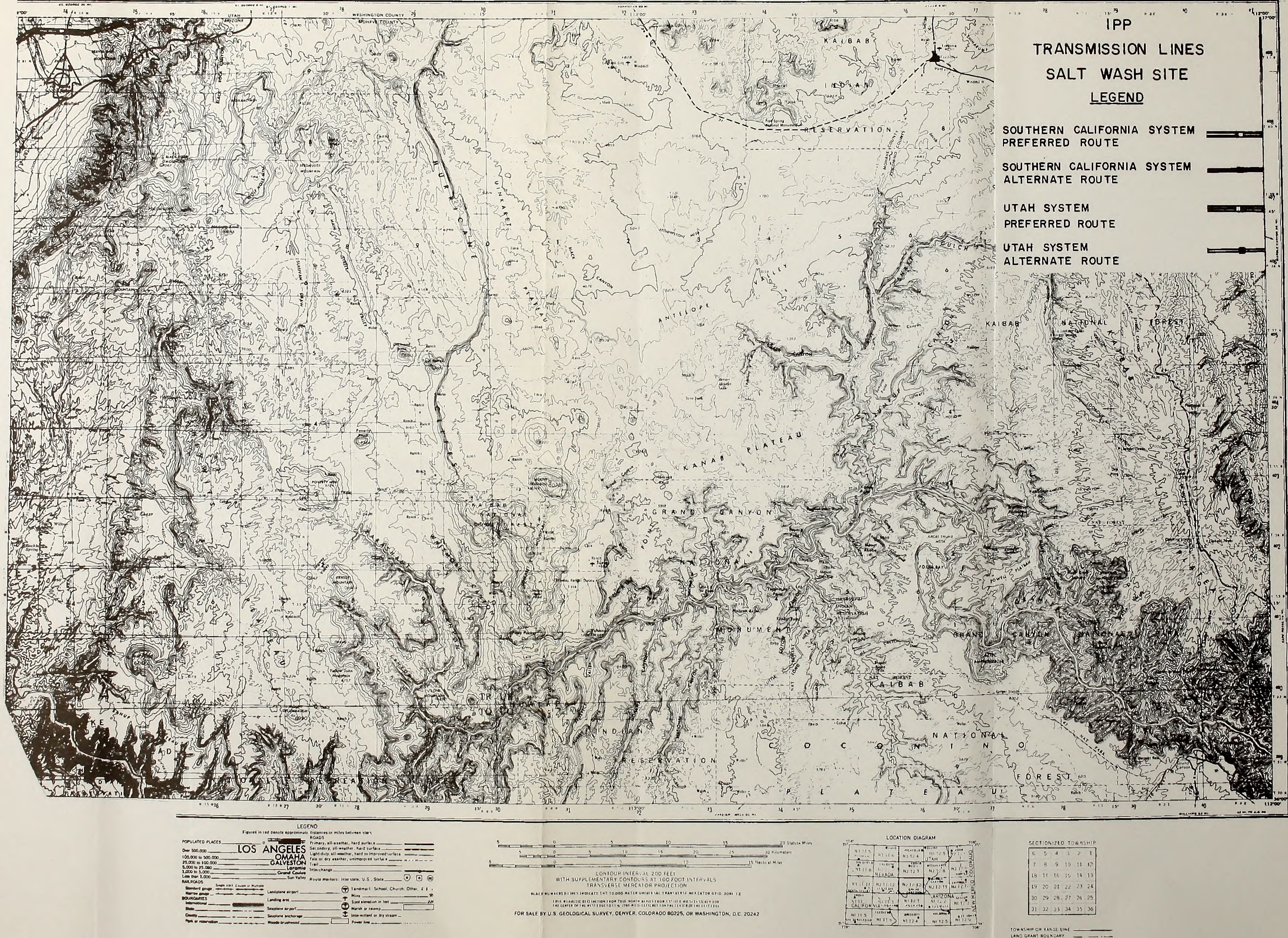
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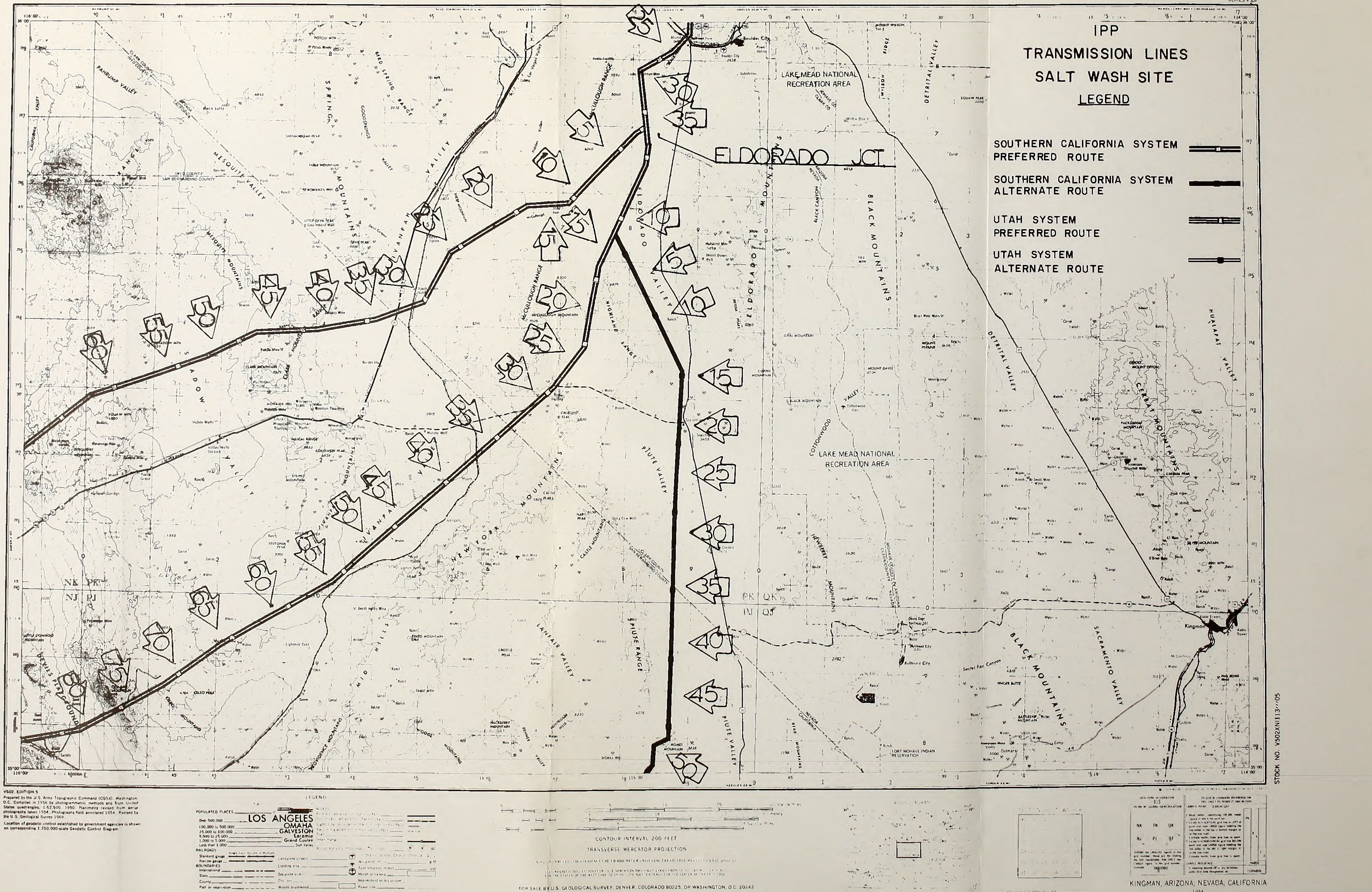

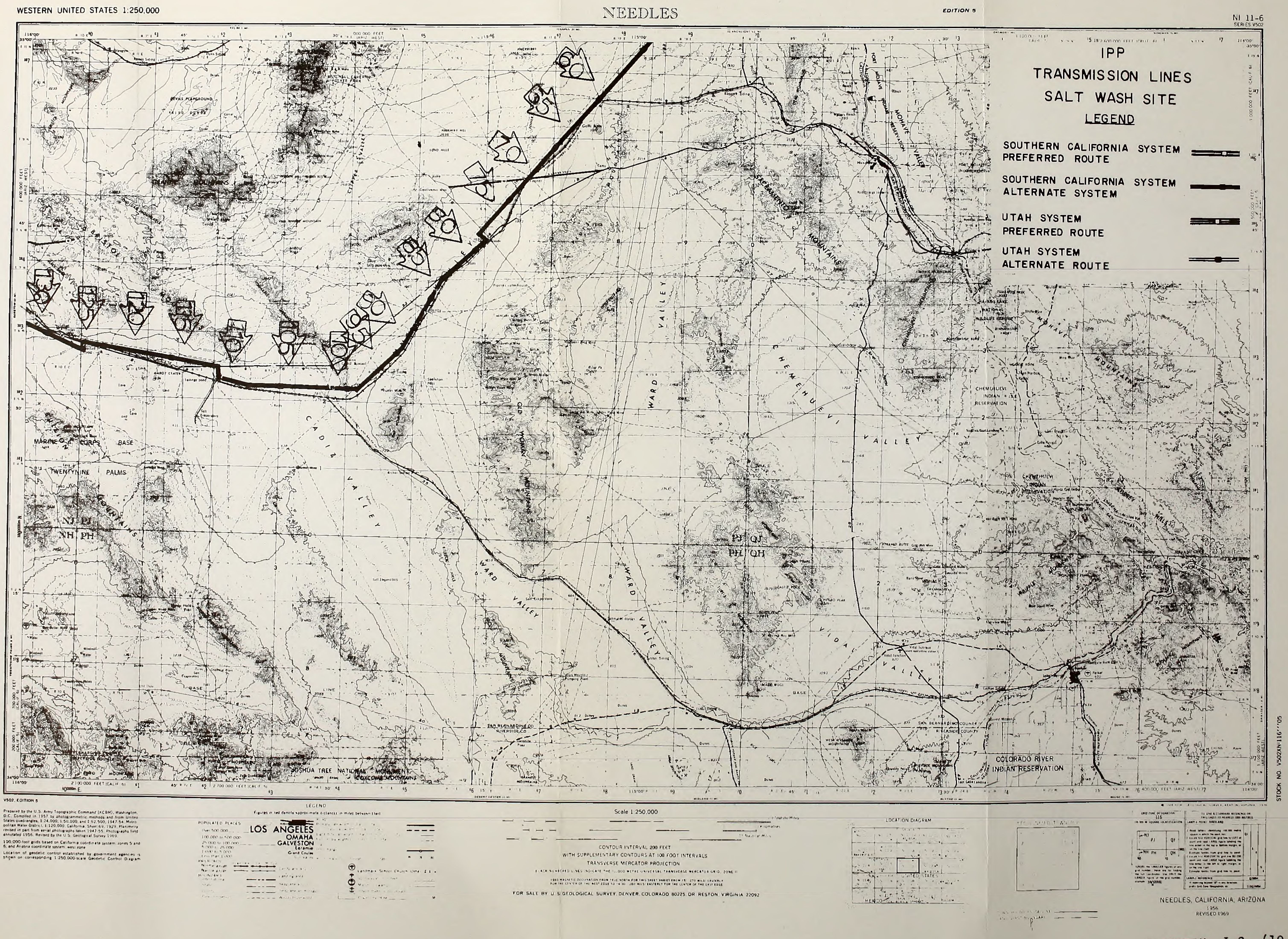
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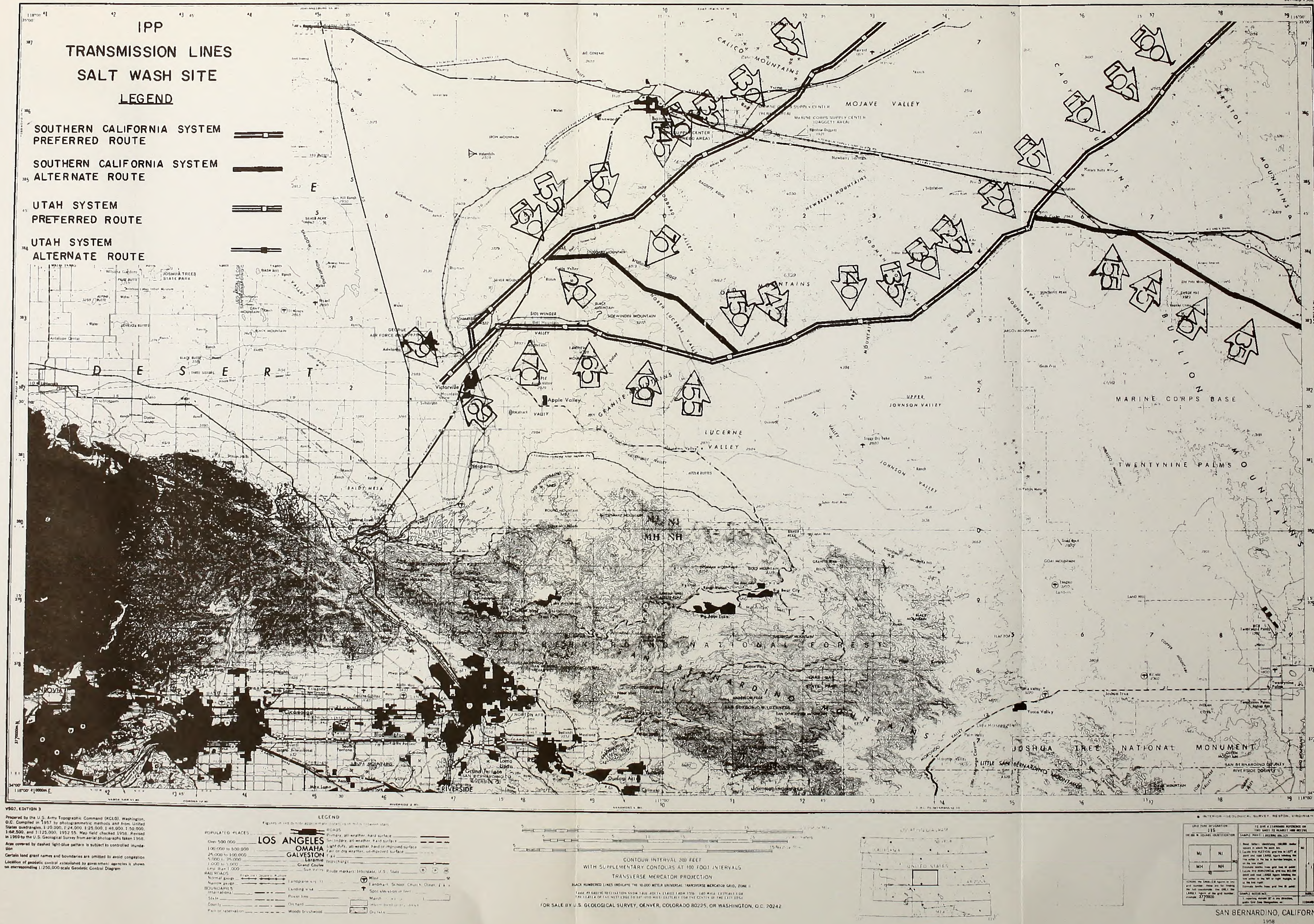
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TWENTYNINE PALMS
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Hesperia
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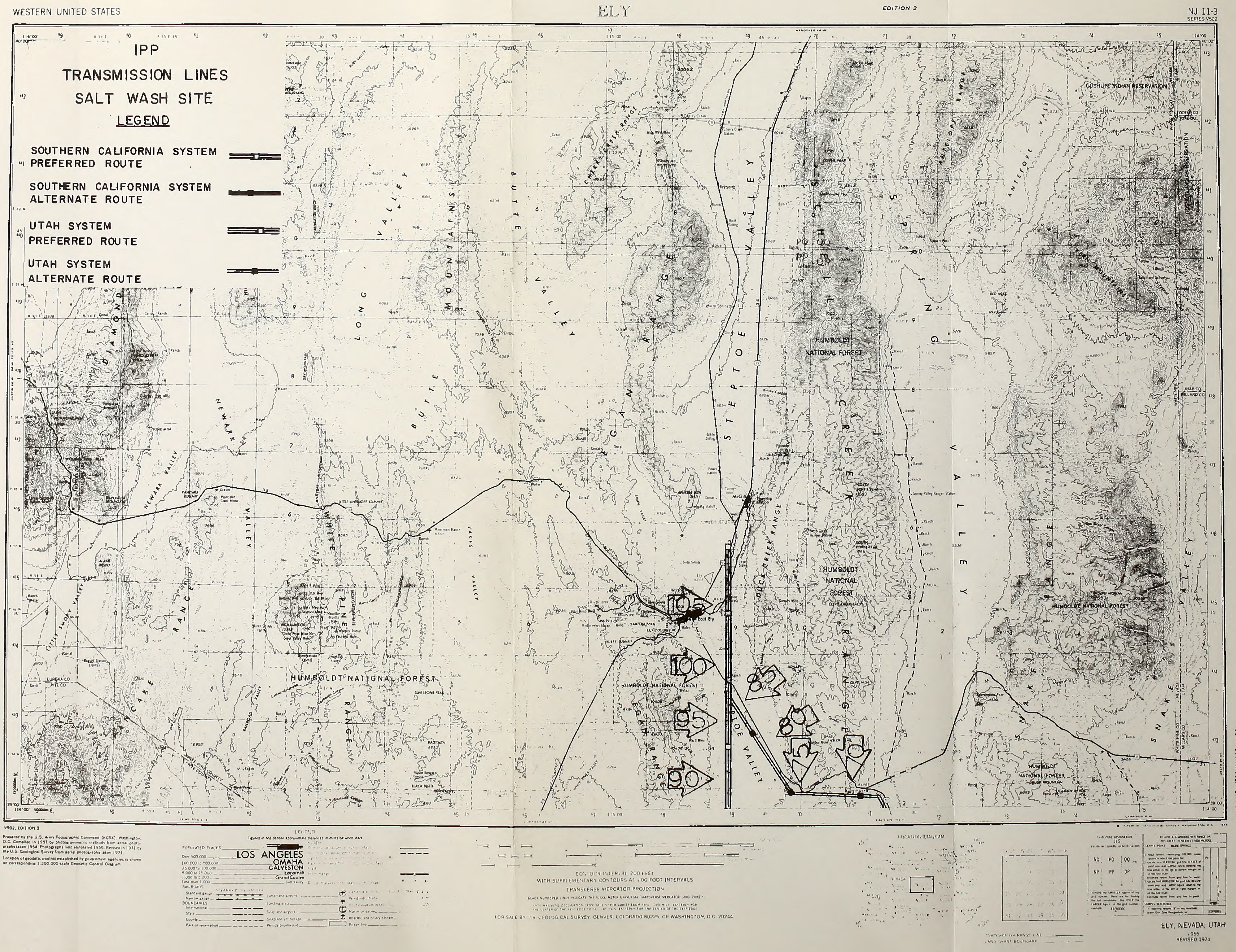
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BUTTE VALLEY
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SNAKE RANGE
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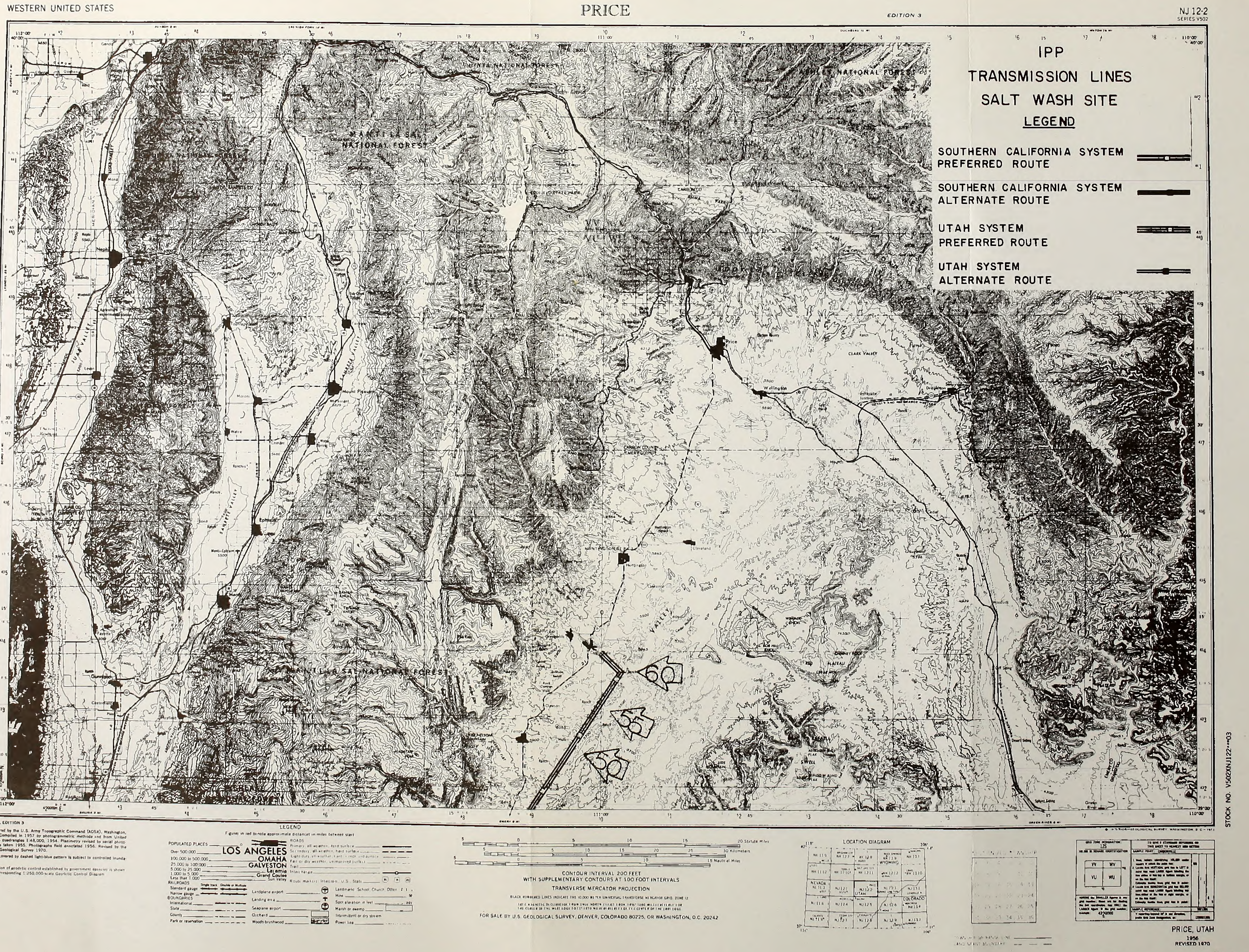
LOS ANGELES
OMAHA
GALVESTON
ELY, NEVADA; UTAH
1956
REVISED 1971
STOCK NO. V502XNJ113**03



APPENDIX I-3 (13 of 13)

APPENDIX I-4

Acreage Requirements for Proposed Transmission Systems
Within Right-of-Way Applied for by IPP

Line Segment	Length (miles)	Number & Size (kV) of Lines in Segment[a]	Towers Per Miles	Assumed Length of Individual Stub Roads[b]	Disturbed By Stub Roads: Miles	Disturbed By Stub Roads: Acres[c]	Disturbed By New Access: Miles	Disturbed By New Access: Acres[c]	Disturbed By Stub and Access Roads: Miles	Disturbed By Stub and Access Roads: Acres[c]	Tower Pads Disturbed Acres[d]	Total Disturbed: Acres	Total Disturbed: Acres Per Mile	Permanent New Access (Occupied): Miles	Permanent New Access (Occupied): Acres[e]	Tower Pads Occupied Acres[f]	Total Occupied: Acres	Total Occupied: Acres Per Mile
A. Salt Wash to Jack Henry Jct.	106.0	1-500 1-500 1-345	4.012 4.01 7.06	225 225 225	18.1 18.1 31.9	30.75 30.75 54.12	103	175	171	291	382.74 382.74 74.84	1,131	10.673	10	17	17.01 17.01 16.09	67.11	0.63[illegible]
B. Jack Henry Jct. to Bald Hills	31.3	1-500	4.01	100	2.38	4.04	33	56	35	60	113.02	173	5.528	3	5	5.02	10.02	0[illegible]
E. Jack Henry Jct. to Paragonah	22.0	1-500 1-345	4.01 7.06	150 150	2.51 4.41	4.26 7.49	0	0	7	12	79.44 15.53	107	4.862	0	0	3.53 3.34	6.87	0.[illegible]3
C. Bald Hills to Lincoln	70.0	1-500 1-230	4.01 7.06	137 137	7.31 12.87	12.41 21.84	55	93	75	127	252.76 49.42	429	6.131	6	10	11.23 10.63	31.86	0.4551
D. Lincoln to Gypsum	126.0	1-500	4.01	66	6.32	10.72	55	93	61	104	454.96	559	4.436	6	10	20.22	30.22	0.2398
F. Paragonah to St. George	61.0	1-500 1-230	4.01 7.06	137 137	6.37 11.22	10.82 19.03	73	124	91	154	220.25 43.07	417	6.841	7	12	9.79 9.26	31.05	0.5090
G. St. George to Cedar Wash	16.0	1-500	4.01	100	1.22	2.06	22	37	23	39	57.77	97	6.048	3	5	2.57	7.57	0.4731
H. Cedar Wash to Gypsum	89.0	1-500	4.01	110	7.36	12.49	8	14	15	26	321.36	347	3.903	0	0	14.28	14.28	0.1604
I. Gypsum to Eldorado Junction	38.0	1-500 1-500	4.01 4.01	230 230	6.64 6.64	11.26 11.26	0	0	13	23	137.21 137.21	297	7.827	0	0	6.10 6.10	12.20	0.3211
J. Eldorado Jct. to Victorville L. #1	28.3 139.7	1-500	4.01 4.01	66 125	1.42 17.51	2.41 29.72	27	46	46	78	102.19 504.43	685	4.075	3	5	4.54 22.42	31.96	0.1902
K. Eldorado Jct. to Victorville, L. #2	178.0	1-500	4.01	165	22.32	37.87	49	83	71	121	642.72	764	4.291	5	8	28.57	36.57	0.2054
U-4 Paragonah to Bald Hills	16.0	1-230	7.06	36	0.78	1.32	20	34	21	35	11.30	46	2.894	2	3	2.43	5.43	0.3394
U-6 Lincoln to Gonder	108.8	1-230	7.06	36	3.0	5.09	125	212	128	217	76.81	294	2.700	5	8	16.51	24.51	0.2[illegible]
U-1 IPP to Emery	60.0	1-345	7.06	50	3.97	6.74	115	195	119	202	42.36	244	4.073	10	17	9.11	26.11	0.4[illegible]
Totals	1,090.1				192.35	326.45	685	1,162	877	1,488	4,102.13	5,591	5.129	60	100	235.76	335.76	0.30[illegible]

[a]The 500-kV lines are the Southern California Transmission System; 230-kV and 345-kV are the Utah Transmission System.

[b]Assumes that stub road length would be 50 percent of the total width of rights-of-way including other transmission lines when IPP would share common corridor with existing transmission lines.

[c]Width of access and stub roads is 14 feet.

[d]500-kV towers disturb 0.9 acre.
230-kV and 345-kV towers disturb 0.1 acre.

[e]Ten percent of new access is assumed permanent.

[f]500-kV towers occupy 0.04 acre.
345-kV towers occupy 0.03 acre.
230-kV towers occupy 0.02 acre.

APPENDIX I-5

Land Status of Right-of-Way
In the Southern California Transmission System

Line Segment Description in Three Subdivisions	Miles of Right-of-Way: Total By Segment	Public Lands BLM[a]	Bureau of Reclamation	USFS	State	Private	County[b]	Acres: Occupied by Poles and Footings[c]	Right-of-way Corridor Applied for By IPP
Northern Transmission Route									
Jack Henry Junction to Bald Hills Junction, one new 500-kV d.c. line (Segment "B").	31	27(Ut)			1(Ut)	3	31 Iron	5	752
Bald Hills Junction to Lincoln Junction, one new 500-kV d.c. line (one 230-kV a.c. line for Utah Transmission System) (Segment "C").	70	22(Ut) 15(Nev)			4(Ut)	29	49 Iron 21 Lincoln	22	2,333
Lincoln Junction to Gypsum Junction, one new 500-kV d.c. line (Segment "D").	126	126(Nev)					83 Lincoln 43 Clark	20	3,055
Eldorado Jct. to Victorville converter station, Line 1, one new 500-kV d.c. line (Segment "J").	168	26(Nev) 115(CA)			6(CA)	21	53 Clark 115 San Bernardino	27	4,073
Southern Transmission Route									
Jack Henry Junction to Paragonah substation, one new 500-kV d.c. line (one new 345-kV a.c. line for Utah Transmission System)(Segment "E").	22	1(Ut)			1(Ut)	20	22 Iron	7	800
Paragonah substation to St. George substation, one 500-kV d.c line (one new 230-kV a.c. line for Utah Transmission System) (Segment "F").	61	24(Ut)			10(Ut)	27	30 Iron 31 Washington	19	2,034
St. George substation to Cedar Wash Junction, one 500-kV d.c. line (Segment "G')	16	10(Ut)			3(Ut)	3	16 Washington	3	388

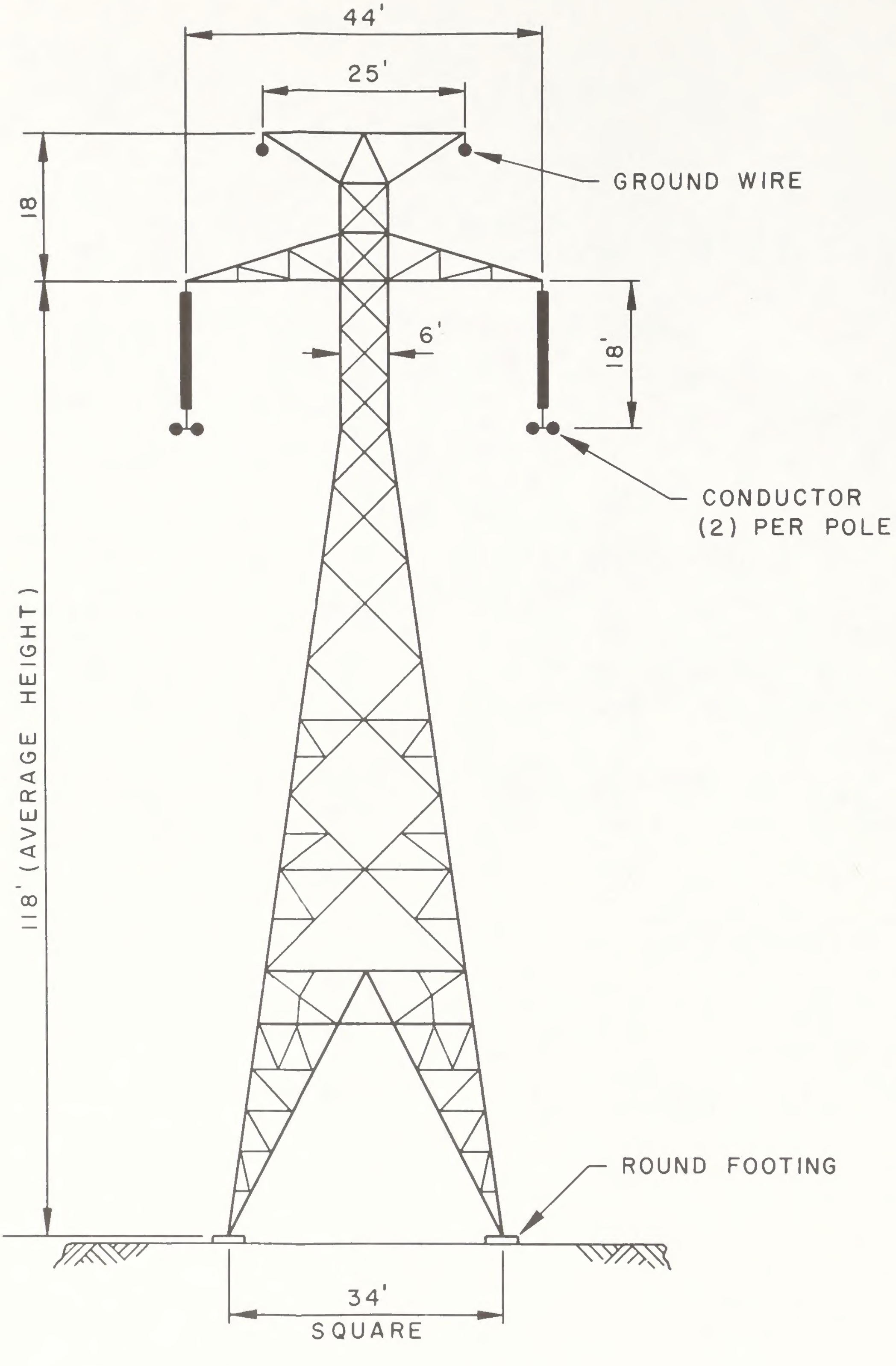
APPENDIX I-5 (concluded)

Line Segment Description in Three Subdivisions	Miles of Right-of-Way: Total By Segment	Public Lands BLM[a]	Bureau of Reclamation	USFS	State	Private	County[b]	Acres: Occupied by Poles and Footings[c]	Right-of-way Corridor Applied for By IPP
Cedar Wash Junction to Gypsum Junction, one 500-kV d.c. line (Segment "H").	89	6(Ut) 10(Ariz) 70(Nev)	1			2	6 Washington 10 Mohave 19 Lincoln 54 Clark	14	1,402
Eldorado Jct. to Victorville converter station, Line 2, one 500-kV d.c. line (Segment"K").	178	119(CA) 27(Nev)			5(CA)	27	27 Clark 151 San Bernardino	29	4,315
Common Route									
IPP to Jack Henry Junction, two 500-kV d.c. lines (one 345-kV line for Utah System) (Segment "A").	106	78(Ut)		19 Fishlake	8(Ut)	1	14 Wayne 10 Emery 22 Sevier 33 Piute 15 Garfield 12 Iron	50	5,782
Gypsum Junction to Eldorado Junction two 500-kV d.c. lines (Segment I)	38	29(Nev)	4			5	38 Clark	12	1,520
TOTAL	868	[a]705	5	19	27 (Ut) 11 (CA)	138	[b]905	[c]208	26,454

[a]Public land administered by the Bureau of Land Management, divided by state: 168 miles Utah State Office, 293 miles Nevada State Office, 10 acres Arizona State Office, 234 miles California State Office.

[b]All lands divided by counties within each state. 291 miles State of Utah (14 Wayne Co., 10 Emery Co., 22 Sevier Co., 33 Piute Co., 15 Garfield Co., 144 Iron Co., 53 Washington Co.). Ten miles State of Arizona (Mohave Co.), 338 miles State of Nevada (123 Lincoln Co., 215 Clark Co.); 266 miles State of California (266 San Bernardino Co.).

[c]Includes 39.5 acres occupied by poles and footings of portions of the Utah Transmission System in common corridors with the Southern California Transmission System.



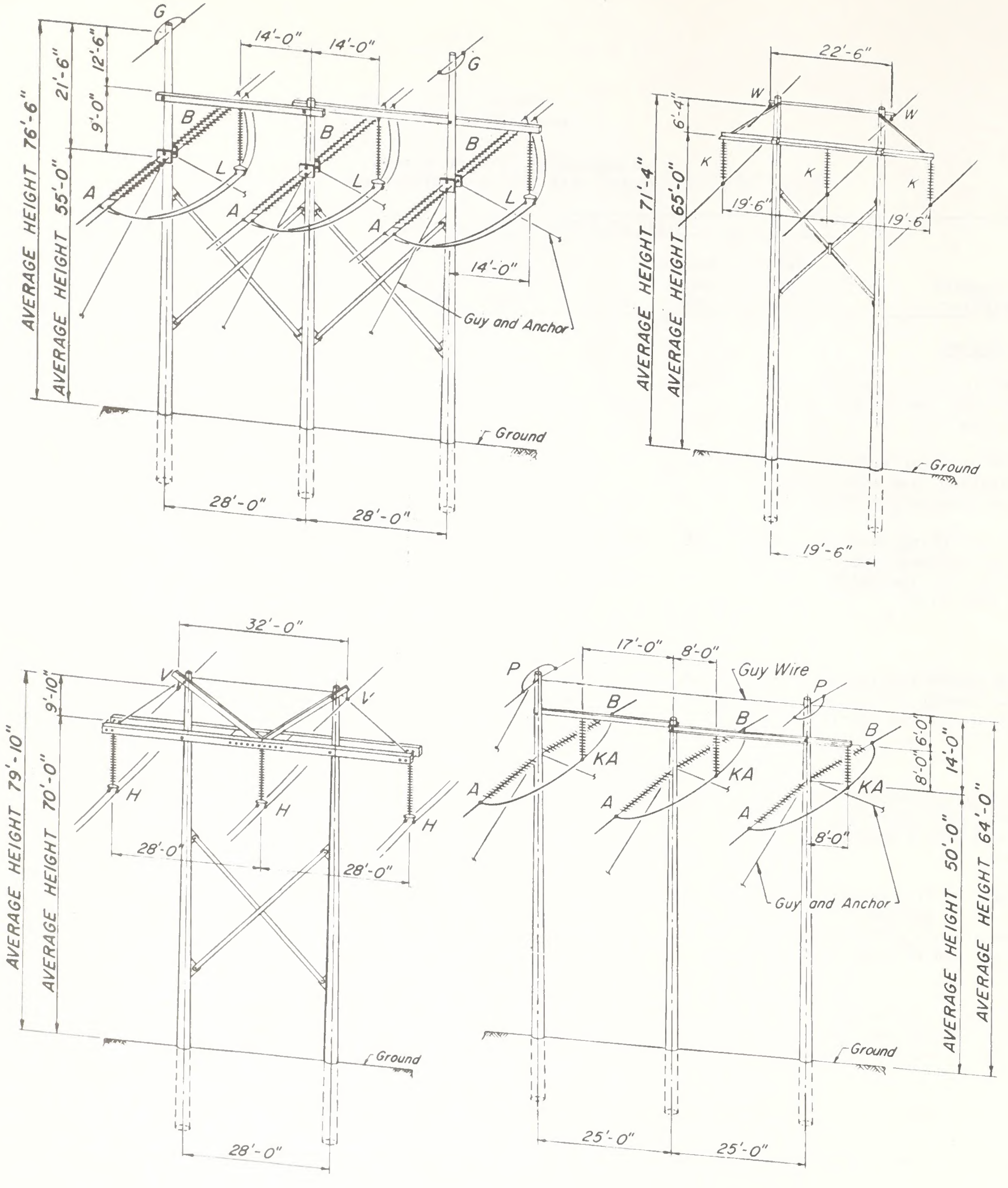
TYPICAL ± 500KV DC BIPOLAR FREESTANDING SUSPENSION TOWER

APPENDIX I-6

APPENDIX I-7

Land Status of Right-of-Way in the Utah Transmission System

Line Segment Description	Miles of Right-of-Way						Acres	
	Total By Segment	Public Lands BLM	USFS	State	Private	County	Occupied by Poles and Footings	Right-of-Way Corridor Applied for By IPP
Utah System								
1. IPP to Emery power plant, one new 345-kV wood pole line	60	38(Ut)		9(Ut)	13	1 Wayne 59 Emery	9	1,091
2. IPP to Otter switching station, one new 345-kV wood pole line[a]	61						9	754
Otter switching station to Paragonah substation, one new 345-kV wood pole line[a]	67	79	19	9(Ut)	21	34 Iron 15 Garfield 33 Piute 22 Sevier 10 Emery 14 Wayne	10	892
3. Paragonah substation to St. George switching station, one new 230-kV wood pole line	61 2	24		10(Ut)	27 2	30 Iron 31 Washington 2 Washington	9.5 0.5	688 27
4. Paragonah Substation to Bald Hills Juncton, one new 230-kV wood pole line	16	10(Ut)		1(Ut)	5	16 Iron	2	213
5. Bald Hills Junction to Lincoln substation (also Lincoln Junction) one new 230-kV wood pole line[a]	70	37		4(Ut)	29	40 Iron 21 Lincoln	11	789
6. Lincoln substation to Gonder substation, one new 230-kV wood pole line	109	101(Nev)			8	50 White Pine 59 Lincoln	17	1,453
Total	446 (187)	289 (149)	19 (0)	33 (10)	105 (28)	446 (187)	68 (28.5)	5,907 (2,784)



TYPICAL UTAH TRANSMISSION SYSTEM STRUCTURE DESIGN

APPENDIX I-8

APPENDIX I-9

Federal Authorizing Actions

Two of the authorizing actions are of note because procedures for undertaking such actions under the Federal Land Policy and Management Act (FLPMA) are still being developed. These are: 1) The proposed transfer of ownership of the site for the generating station and new town by BLM (under Section 203 of FLPMA) and (2) granting of transmission line right-of-ways following the concept of "corridors" by BLM and USFS (Section 503 of FLPMA).

The act requires that for the proposed transfer of wonership, land use planning, as required under Section 202 of the act, be developed or updated, and that subsequently, a determination be made that the following disposal criteria as stated in Section 203 would be met.

> "Such tract because of its location or other characteristics is difficult and uneconomic to manage as part of the public lands, as is not suitable for management by another federal department or agency; or
>
> Such tract was acquired for a specific purpose and the tract is no longer required for that or any other federal purpose; or
>
> Disposal of such tract will serve important public objectives, including but not limited to, expansion of communities and economic development, which cannot be achieved prudently or feasibly on land other than public land and which outweigh other public objectives and values, including but not limited to, recreation and scenic values, which would be served by maintaining such tract in federal ownership."

Procedures stated in the act for tracts over 2,500 acres also would be applicable. These involve the requirement for the Secretary of the Interior to submit notice to the Senate and the House of Representatives and a 90-day waiting period to allow for actions which may be taken by the Congress with regard to a designated sale.

Regarding the granting of transmission rights-of-way, Section 503 of the act (FLPMA) requires:

> In order to minimize adverse environmental impacts and the proliferation of separate rights-of-way, the utilization of rights-of-way in common shall be required to the extent practical, and each right to grant additional rights-of-way granted pursuant to this Act. In designating right-of-way corridors and in determining whether to require that rights-of-way be confined to them, the Secretary concerned sall take into consideration national and State land use policies, enviornmental quality, economic efficiency, national security, safety, and good engineering and technological practices.

During the applicant's planning process, considerable attention was given to locating transmission lines (either proposed or al alternatives) adjacent

to existing roads and powerlines. The environmental statement team also identified alternatives which would reduce impacts. Pending issuance of final rulemaking to implement Section 503, BLM is considering and incorporating, where appropriate, the principles and policies responsive to Section 503 in its environmental analyses and land use planning. All of the factors noted in the above paragraph quoted from FLPMA would be considered in the decision-making process, either in planning documents, this environmental statement, or subsequent reports which would support decisions. (See also Chapter 3 - Coordination With Existing Land Use Plans).

APPENDIX II-1
Baseline Air Quality Monitoring

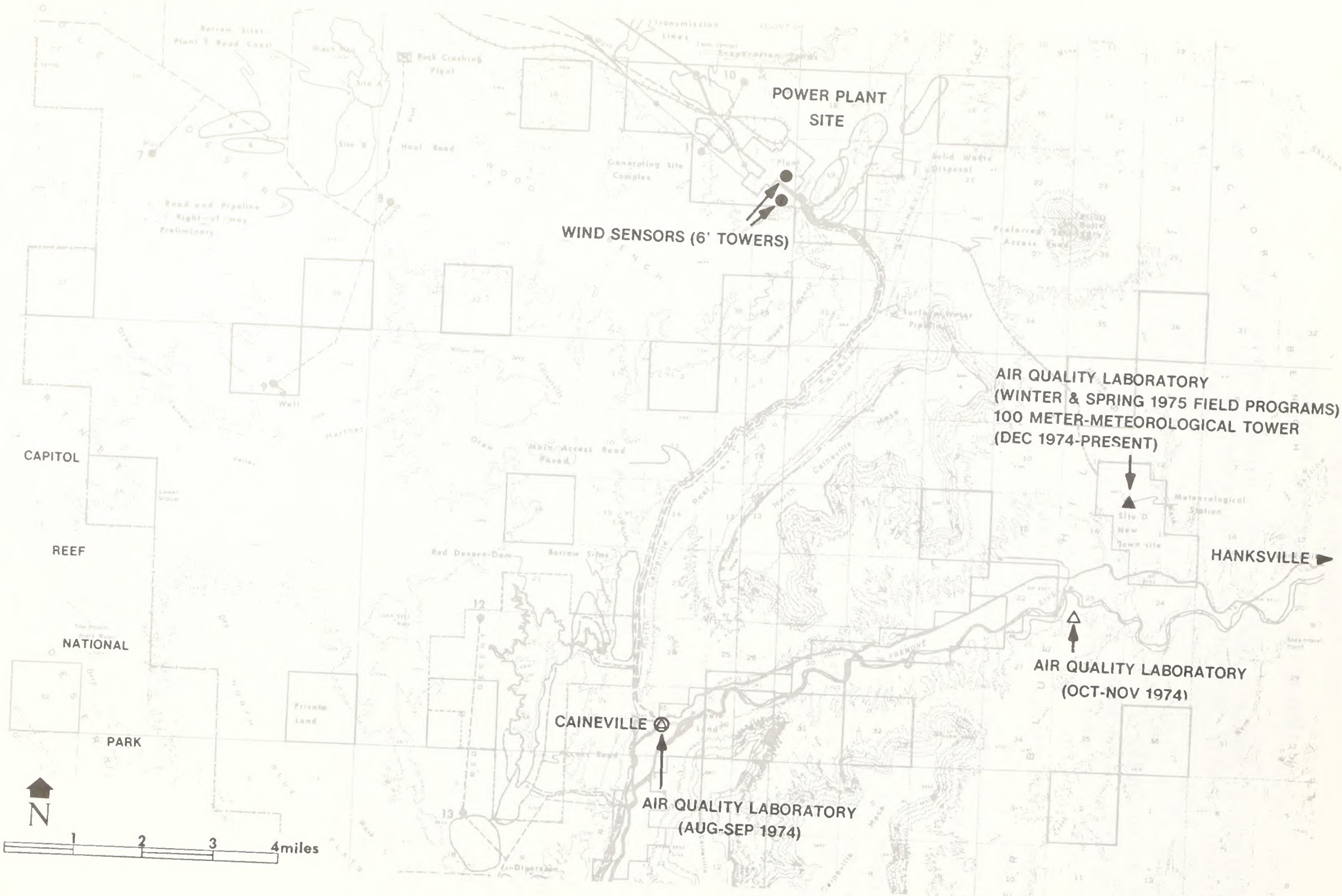
A meteorological and air quality monitoring program began in August 1974 and extended over several methods of measurement to collect the required data. A meteorological tower instrumented at the 10- and 100-meter levels, located on Factory Bench (See Figure 1) at an elevation of 4,600 feet mean sea level (m.s.l.) and approximately 7 miles southeast of the proposed site, comprises the primary system. The tower was located in a relatively flat open area where terrain features would have little effect on the lower level flow conditions.

Wind speed, wind direction, temperature, and relative humidity were measured at both levels. The difference in temperature between the 10- and 100- meter levels (a measure of atmospheric stability) was also recorded. A recording rain gauge is located near the tower. All measurements were continuous.

As shown in Figure 1, two other wind sensors record the low level flow conditions near the Salt Wash site. One is located on the proposed site and the other is approximately 1/2 mile southwest of the site near the edge of Wood Bench plateau at an elevation of 5,200 feet m.s.l.

Together, the measurements document the meteorological characteristics of the plant site and provide primary input data for models used to estimate the plant's impact on air quality. Wind direction would determine the path an effluent plume would take. Wind speed affects the height to which a plume would rise above the stack and amount of dilution which would take place downwind of the stack. The difference in temperature between the upper and lower temperature sensors would determine the extent of vertical spreading of a plume. The standard deviation of wind direction is a measure of the extent to which a plume would spread horixontally. The number of hours the wind continues to blow in the same direction (wind persistence) is also an important factor since it would directly affect the concentration of effluents at downwind locations (receptors).

In addition to data gathered from the meteorological tower, wind speed, wind direction, and temperature were measured at several levels above the ground for three weeks each season during last half of 1974 and first half of 1975. Pilot balloons (pibals) were used to measure wind speed and direction. Temperature measurements were made with an instrumented aircraft. Figure 1 shows the time periods during which meteorological and air quality data were collected at each monitoring site location.



AIR QUALITY AND METEOROLOGICAL STATIONS FOR PLANT SITE

FIGURE 1

APPENDIX II-2
Atmospheric Dispersion

1. Inversion

An atmospheric layer in which temperature increases with height is called an inversion. Pollution is directly related to dispersion and any inversion inhibits dispersion. Inversions are classified according to the method of formation.

Most common at the Salt Wash site is the surface radiation inversion, which is formed by the loss of heat by long wave radiation from the ground which in turn cools the adjacent air. This radiational cooling is very efficient during nights with clear skies and low atmospheric moisture common in a desert environment. The frequency of day and night inversions is shown in Table 1. The table shows that inversions, although they may be limited in duration, are a frequent occurance at the Salt Wash site.

2. Mixing Height

Two major factors of importance in the transport and diffusion of pollutants are mixing height and mean mixing layer wind speed. (Mean wind speed in the mixing layer is the average wind speed between the surface level and the mixing height.)

In the general area of the Salt Wash site, mixing heights are lowest during the spring season as shown in Table 2. Afternoon mixing heights range from 1,100 meters in winter to 4,000 meters in summer.

During summer, morning mixing heights are lowest and afternoon heights are highest. Therefore, on a daily basis, pollutants that become trapped during the morning hours would be dispersed through a large mixing layer in the afternoon.

Instances where mixing heights and wind speeds remained below specified levels for 2 days and 5 days were tabulated by Holzworth for the United States (Holzworth, 1971). These tabulations indicate that the potential exists for pollutants to build up during these stagnation periods. In the general Salt Wash area, there were 20 cases in 5 years in which mixing heights of 500 meters or less and wind speeds of 4 meters per second (m/s) or less persisted for at least 2 days. During the same period, there was one case in which these conditions persisted for 5 days.

Mixing heights calculated for the Salt Wash site and Holzworth's study indicate that dispersion conditions in southeastern Utah are generally restricted during the morning hours and are excellent in the afternoon. Also, the frequency of prolonged periods (5 days or more) of restricted dispersion conditions is quite low.

3. Plume Dispersion and Pasquill Stability Categories

The amount of dilution which would take place in a plume as it traveled downwind would be dependent upon wind speed, vertical temperature profile, and fluctuations in wind direction. As wind speed increases, the effluent would be introduced into a greater volume of air per unit of time. Standard deviation of wind direction (a measure of the variability of wind direction) was calculated based upon direction measurements at the 10- and 100-meter levels of the Factory Bench meteorological tower.

TABLE 1

Frequency of Inversions for the Salt Wash Area

Season	Percent of Total Observations[a]
Winter	52
Spring	33
Summer	40
Fall	50
Annual	44

Frequency of Night Time Inversions
for the Salt Wash Area

Season	Percent of Nights[a]
Winter	90
Spring	71
Summer	90
Fall	90
Annual	88

Frequency of Inversions Measured at the Salt Wash Site[b]

Season	Inversion Frequency (Percent of Morning Temperature Soundings)
Winter	82
Spring	33
Summer	100
Fall	57
Annual	65

Source: [a]Hosler, 1961.

[b]Field Monitoring Program (Westinghouse, 1977).

TABLE 2

Mean Seasonal and Annual Morning and Afternoon Mixing Heights and Wind Speeds in the Vicinity of the Salt Wash Site (1960 Through 1964)

	Morning		Afternoon	
	Mixing Height (m)	Wind Speed (m/sec)	Mixing Height (m)	Wind Speed (m/sec)
Winter	270	3.3	1,100	4.4
Spring	410	5.2	3,000	6.9
Summer	250	4.2	4,000	6.5
Fall	230	4.0	2,150	5.3
Annual	290	4.2	2,560	6.2

Source: Holzworth, G. C., 1971.

Vertical spreading of a plume would be closely related to the vertical temperature profile which is related to atmospheric stability. When the temperature decreases with height at a rate higher than 1° C per 100 meters, the atmosphere is unstable and vertical motions are enhanced. When temperature decreases at a lower rate or actually increases with height, vertical motions are dampened or reduced. The temperature difference between the 10- and 100- meter levels of the meteorological tower were recorded continuously.

Standard deviation of wind direction have been related to six stability classes by Pasquill (Pasquill, 1961). The Nuclear Regulatory Commission uses measurements of the temperature difference (ΔT) divided by elevation (ΔZ) and relates this to the same six stability classes. The stability classes along with the related and $\Delta T/\Delta Z$ are presented in Table 3.

TABLE 3

Pasquill Stability Categories

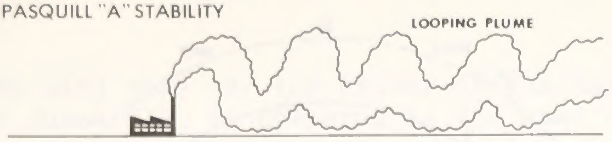
Pasquill Category		$\Delta T/\Delta Z$ (C°/100 m)	Standard Deviation of Wind Direction
A	(Extremely Unstable)	Less than -1.9	Greater than 23
B	(Moderately Unstable)	-1.9 to -1.7	18 to 23
C.	(Slightly Unstable)	-1.7 to -1.5	13 to 18
D.	(Neutral)	-1.5 to -0.5	8 to 13
E	(Stable)	-0.5 to +1.5	4 to 8
F	(Moderately Stable)	Greater than 1.5	Less than 4

To convey the physical meaning of Pasquill's six stability classes, A through F, a series of drawings are presented in Figure 1. In type A diffusion, which occurs on sunny days with winds of variable direction, large convective motions in the atmosphere cause dispersion of the effluent through a large volume of the atmosphere. In type F diffusion, usually occurring at night, there is almost no vertical motion and no vertical expansion of the plume. Wind meander causes the little dispersion that takes place.

4. Lower Level Winds

The percentage of time that wind blows from a certain direction is usually depicted as a "wind rose." Figure 2 contains wind roses for the Salt Wash Site and the 10 meter level at the Factory Bench tower. The two wind roses are similar in that the greatest frequency of winds occur from the southwesterly direction. The Salt Wash site shows a relatively high frequency of west-southwest, and west-northwest winds while 10-meter level winds at Factory Bench show a high frequency of northwest through north winds. The difference is probably a combination of the channeling effect of a bluff to the west of the Salt Wash site and a greater influence of nighttime air drainage over Salt Wash.

PASQUILL "A" STABILITY



STABILITY: EXTREMELY UNSTABLE

WIND SPEED: 3 m/sec OR LESS. MOSTLY CONVECTIVE TURBULENCE

CONDITIONS: DAYTIME INSOLATION; MODERATE TO STRONG

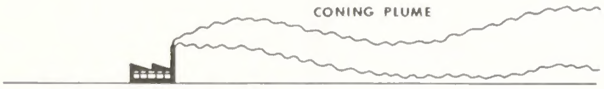
PASQUILL "B" STABILITY

STABILITY: MODERATELY UNSTABLE

WIND SPEED: LESS THAN 4 m/sec MOSTLY CONVECTIVE TURBULENCE

CONDITIONS: DAYTIME INSOLATION; MODERATE TO STRONG

PASQUILL "C" STABILITY

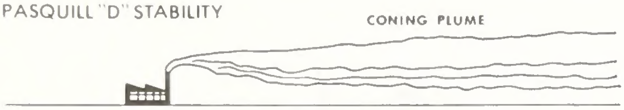


STABILITY: SLIGHTLY UNSTABLE

WIND SPEED: LESS THAN 6 m/sec MECHANICAL & CONVECTIVE TURBULENCE

CONDITIONS: DAYTIME INSOLATION; MODERATE TO STRONG

PASQUILL "D" STABILITY

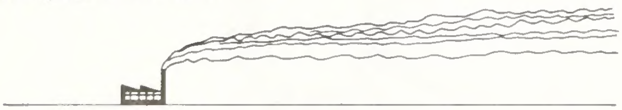


STABILITY: NEUTRAL

WIND SPEED: ALL, NO CONVECTIVE TURBULENCE

CONDITIONS: DAYTIME INSOLATION; SLIGHT; NIGHTTIME; CLOUDY

PASQUILL "E" STABILITY

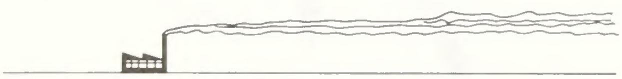


STABILITY: SLIGHTLY STABLE

WIND SPEED: USUALLY LESS THAN 4.5 m/sec

CONDITIONS: NIGHTTIME; MODERATE OUTGOING RADIATION

PASQUILL "F" STABILITY



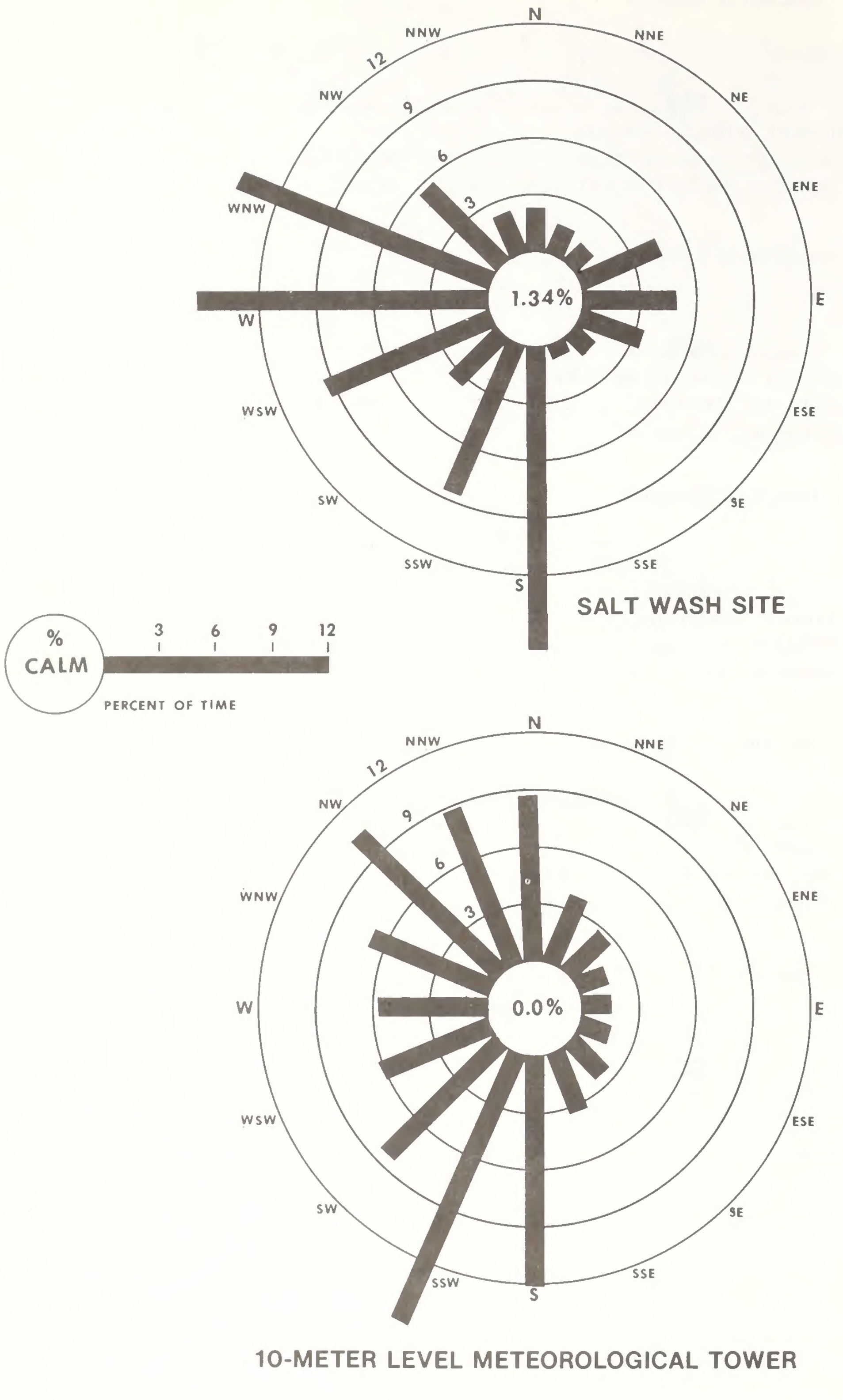
STABILITY: MODERATELY STABLE

WIND SPEED: USUALLY LESS THAN 3 m/sec

CONDITIONS: NIGHTTIME; STRONG OUTGOING RADIATION

PLUME BEHAVIOR FOR PASQUILL STABILITY CLASSES A, B, C, D, E AND F

FIGURE 1



WIND ROSES:
PLANT SITE AND 10 METER LEVEL AT FACTORY BENCH METEOROLOGICAL TOWER

FIGURE 2

In Figure 3, the wind rose for the center of the Salt Wash site, for the period April through June 1975, is compared to the wind rose for the same period at the weather station west of center and closer to the bluff, on the southern boundary of the site. The wind roses are similar except that the winds at the southern boundary of the site have a higher degree of variability and a definitely lower frequency from the southwest through west. This is undoubtedly due to the bluff's sheltering effect.

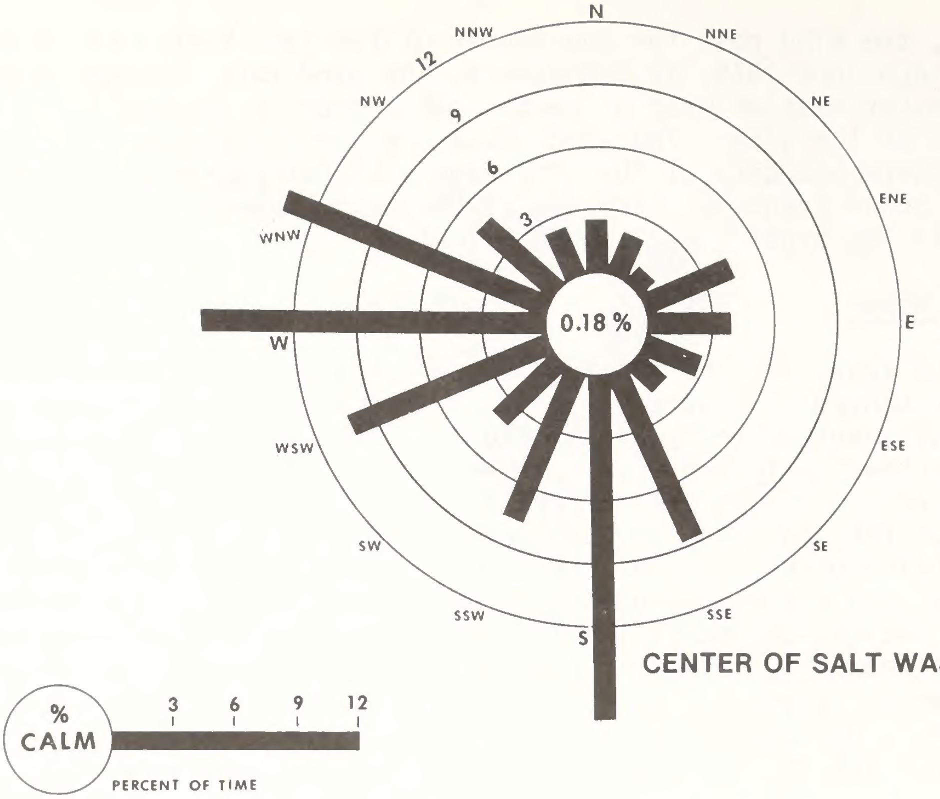
5. Upper Level Winds

Seasonal wind roses for the 100-meter level of the Factory Bench meteorology tower are presented in Figure 4. Annually, west-southwesterly, southwesterly, and south-southwesterly winds occur with the greatest frequency. During summer, southwesterly and west southwesterly winds prevail; in winter the westerly and west-northwesterly directions occur most frequently.

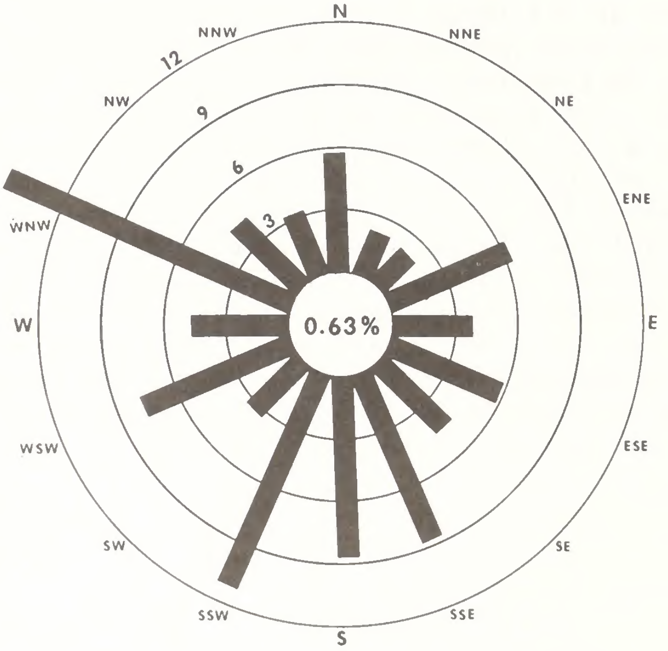
Wind roses at the 366, 640, and 823 meter levels above ground were constructed from pibal studies. These levels were chosen since they approximate the minimum, mean, and maximum height above the ground at which a plume would travel downwind. At the 366 meter level (Figure 5), northerly and southerly winds occur most frequently. Southerly winds occur most frequently at both the 640 and 823 meter levels. Figure 6 depicts wind roses at the 366, 640, and 823 meter levels during neutral and stable conditions. Wind roses for unstable conditions are not included since these conditions occur infrequency at these levels.

The wind roses at all three levels are quite similar for each stability category. Southerly winds predominate during stable conditions, while both southerly and west-northwesterly winds occur with the highest frequency during neutral conditions. The frequency of easterly, southeasterly, and westerly winds is quite low at all three levels during both neutral and stable conditions.

The frequency of occurrence of the six Pasquill stability classes at 100 meter increments above the ground, as determined from temperature soundings, are presented in Table 4. Above the 200 meter level, the atmosphere was either neutral (stability class D) or slightly stable (class E) 97 percent of the time during the morning temperature sounding and 93 percent of the time during the afternoon. In general, the atmosphere is either neutral or slightly stable more than 90 percent of the time above the 200 meter level. Below 200 meters the cooling and heating of the surface causes more fluctuations in the temperature gradient than at the higher levels.



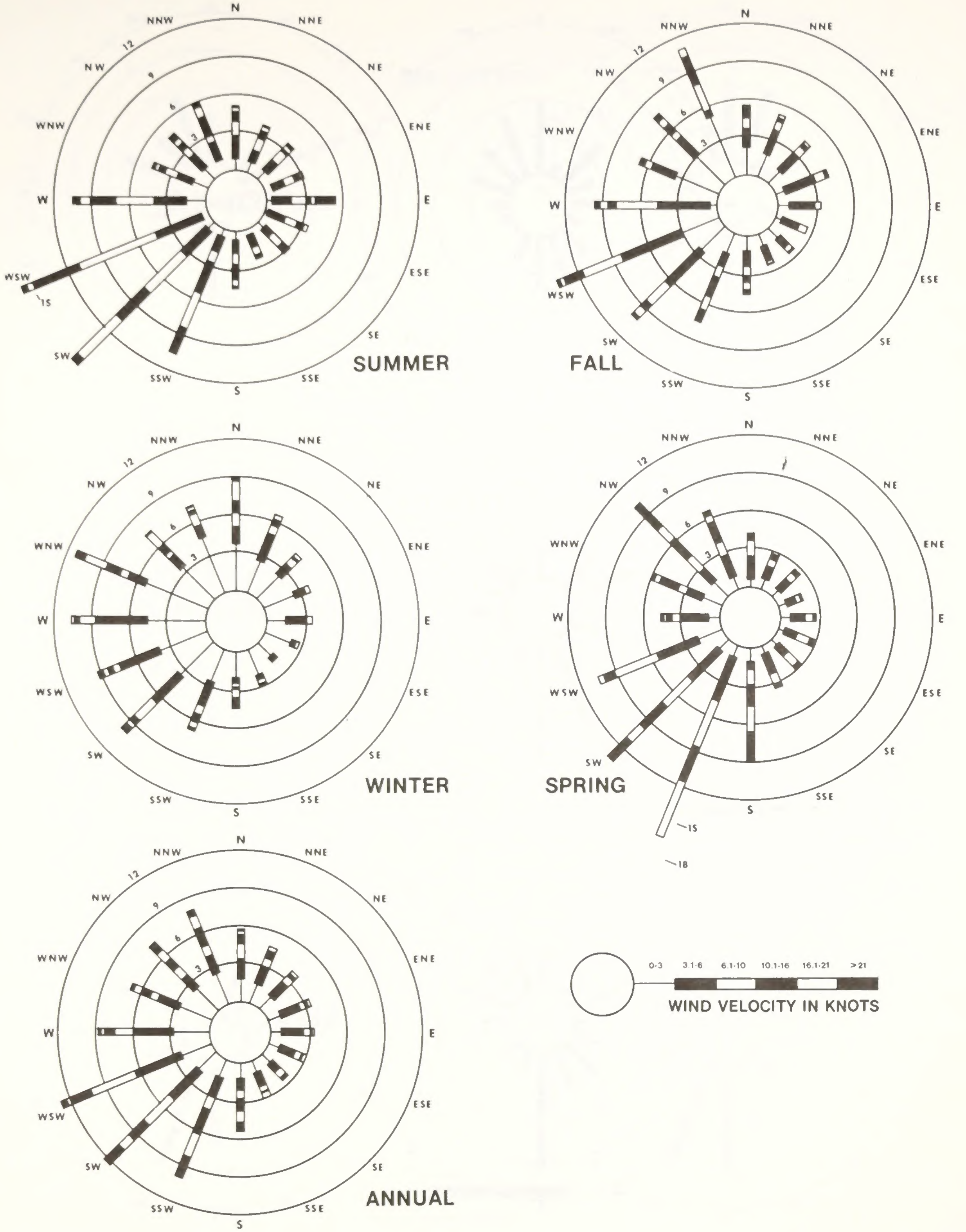
CENTER OF SALT WASH SITE



SOUTHERN BOUNDARY OF SALT WASH SITE

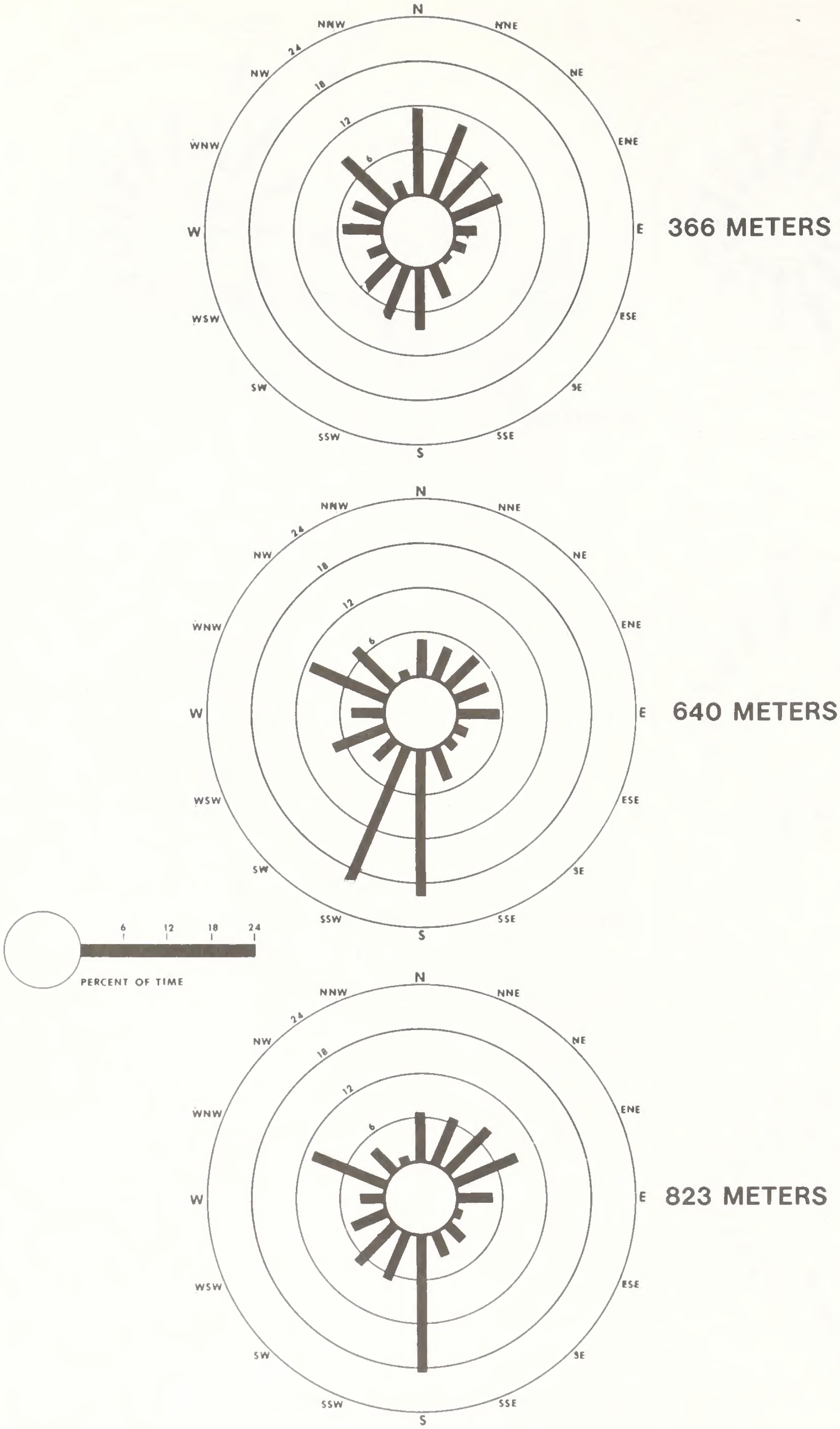
WIND ROSES:
PLANT SITE AND SOUTHERN BOUNDARY OF SITE

FIGURE 3



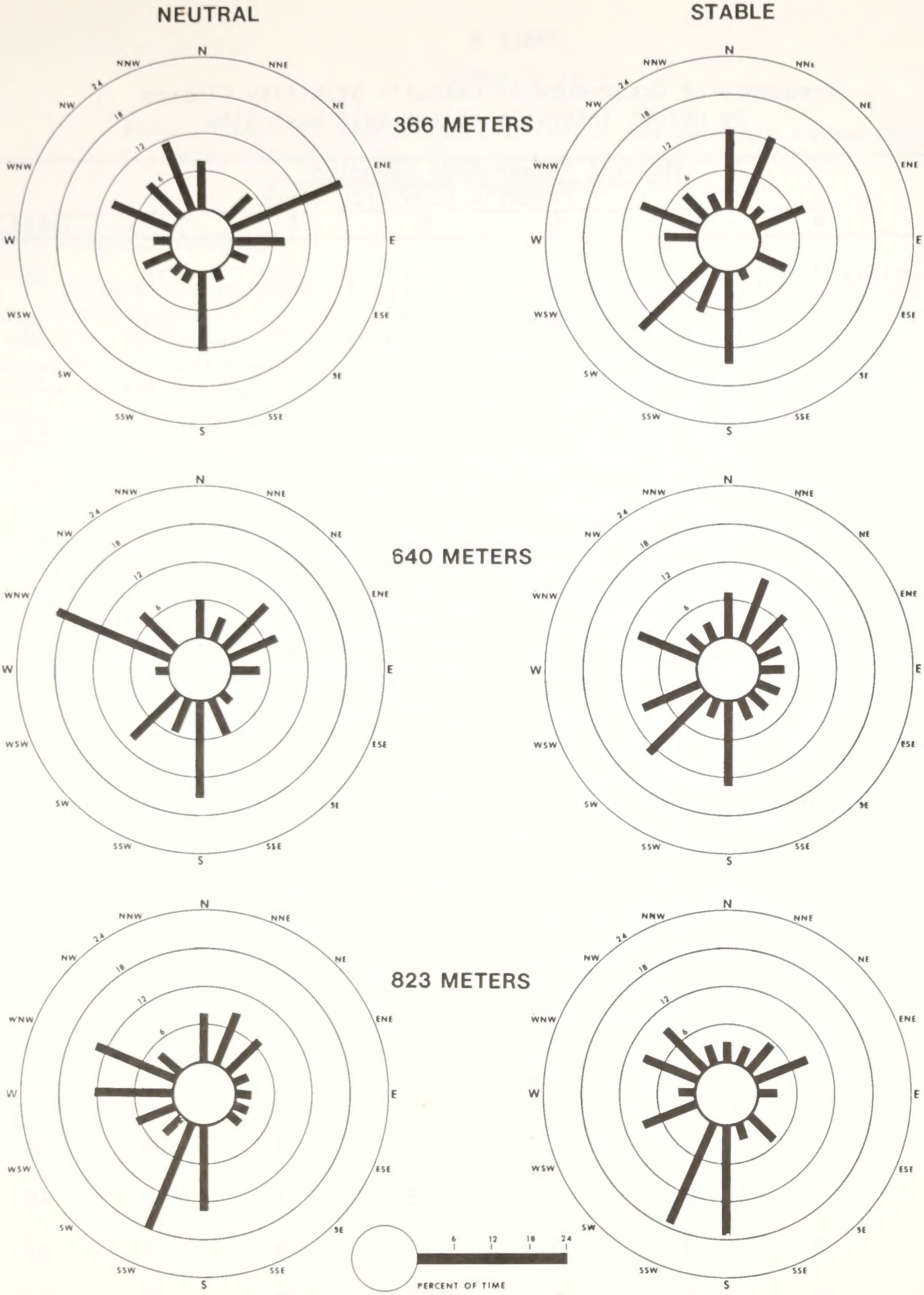
WIND ROSES:
SEASONAL AND ANNUAL: 100 METER LEVEL, FACTORY BENCH METEOROLOGICAL TOWER

FIGURE 4



WIND ROSES: INDICATED LEVELS AT PLANT SITE

FIGURE 5



WIND ROSES: INDICATED LEVELS AT PLANT SITE
INDICATED LEVELS NEUTRAL AND STABLE CONDITIONS

FIGURE 6

TABLE 4

Frequency of Occurrence of Pasquill Stability Classes
By Height Intervals at the Salt Wash Site

Level	A	B	C	D	E	F	Total
	Morning Temperature Sounding						
	Pasquill Stability Class						
0-100 meters	3	0	0	13	31	19	66
100-200	1	1	0	7	54	7	70
200-300	0	1	0	9	43	6	59
300-400	0	0	1	17	34	1	53
400-500	0	0	0	17	33	0	50
500-600	0	0	0	17	30	0	47
600-700	0	0	0	23	17	0	40
700-800	0	0	0	26	21	0	47
800-900	0	0	1	13	20	0	34
900-1000	0	0	0	16	16	0	33
Total	4	2	2	158	299	33	499
	Afternoon Temperature Sounding						
0-100	12	1	7	30	13	0	63
100-200	4	2	4	42	11	0	63
200-300	4	4	1	27	17	3	56
300-400	1	1	3	31	16	1	53
400-500	0	0	3	31	19	0	48
500-600	0	2	0	29	17	0	48
600-700	0	0	0	26	10	1	37
700-800	0	0	0	17	16	0	33
800-900	0	0	0	18	16	0	34
900-1000	9	0	1	18	10	0	29
Total	21	10	19	269	140	5	464

APPENDIX II-3

Paleontological Significance Criteria and Geologic Formations With Potential for High Paleontological Significance Along Proposed Transmission Line Routes

Significance Criteria

In general, vertbrate fossils are considered paleontologically more important than either fossil plants or invertebrate fossils. This results from their being usually better indicators of geologic time, usually better subjects for evolutionary studies and their greater scarcity. Nevetheless, a number of fossil invertebrates and plants are important for various reasons. Generally fossil plants make the best paleoclimatological indicators. The degree of importance of any fossil (regardless of major type) has to be ascertained by the experts who study it and can accurately determine all the ramifications.

The significance ratings shown on Figures 2A thru M are subjective and represent the opinion of professional paleontologists.

The potential significance of each formation, based upon fossil abundance and type present, is inidcated by "H" for potentially highly significant formations, "M" for potentially moderately significant formations and "L" for formations with low significance. Formations may have an abundance of important fossils, a few important fossils, an abundance of relatively unimportant fossils or no fossils at all.

All projections of significance are inferred from a literature search.

APPENDIX II-3 (concluded)

Geologic Formations With Potential for High Paleontological Significance Along Proposed Transmission System Routes

Formation	Line Segment	Mileposts	Types of Fossils	Significance Criteria
Tertiary Lake Sediments	Jack Henry-Lincoln Cedar Wash-Gypsum Eldorado-Victorville(2) Lincoln-Gypsum	88-92, 99-101 24-26 105-107 67-70, 73-75	Mammalian fossil material Fresh water invertebrates Plant fossils	Important data on a poorly understood fauna could be destroyed. Significance of fossils is high, abundance is low.
Tertiary Nonmarine Sediments	Eldorado-Victorville(1)	60-62, 63-64	Mammalian fossils	Important in establishing age relationships of various deposits.
Miocene Nonmarine	Eldorado-Victorville(1)	99-100, 109-110, 123-124, 138-140	Mammalian fossils	Contributes to an understanding of the poorly known fauna of this age.
Dakota Formations	Salt Wash-Emery	35-36	Plant fossils, invertebrate fossils	Valuable in establishing age relationships and as paleontological indicators.
Cedar Mountain Formation	Salt Wash-Emery	30-35, 36-37	Vertebrate and invertebrate fossils, plant fossils	Important in establishing age relationship (Jurassic-Cretaceous period).
Morrison	Salt Wash-Emery Salt Wash-Jack Henry	27-28, 29-30 22-25	Dinosaurs Early mammals Flying reptiles Plant fossils	Most North American dinosaurs are known from the Morrison Formation. Many unique fossils described from the formation.
Curtis	Salt Wash-Emery Salt Wash-Jack Henry	23-24, 25-27 21-22	Fish, shellfish, and other marine invertebrates.	Contains unusual shell fish useful in determining ancient time period (Jurassic-Cretaceous) boundaries. Fossils are abundant but not well studied.
Pogonop Group	Lincoln-Gonder	16-17, 53-54	Algae as well as shellfish, trilobites and other marine invertebrates.	Contains a great variety and abundance of fossils.

APPENDIX II-4

Monthly Discharge for Fremont River Basin Gaging Stations

Fremont River at Bicknell Narrows (acre-feet)

Water Year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept	Annual Total
1947	5,470	6,290	6,540	5,940	6,060	6,470	5,900	4,830	4,330	3,840	4,470	4,920	65,060
1948	5,510	5,900	6,380	6,420	6,630	7,170	9,640	5,280	5,090	4,740	4,770	4,440	71,970
1949	4,280	5,770	6,250	5,870	5,960	7,380	8,090	4,550	4,330	4,350	4,520	4,880	66,230
1950	5,630	5,860	5,690	5,950	6,160	6,330	4,820	4,440	4,240	4,520	4,200	4,560	62,400
1951	4,870	5,290	5,980	5,900	5,550	5,530	4,790	4,550	4,110	4,450	5,050	4,670	60,740
1952	5,150	5,080	5,430	5,980	5,970	6,380	5,830	5,650	4,150	3,720	4,730	5,290	63,810
1953	5,300	5,740	6,400	6,850	6,040	6,280	5,060	4,680	4,040	4,470	4,440	4,400	63,700
1954	5,180	5,420	5,730	6,220	5,530	5,380	4,740	4,520	4,000	4,190	3,990	4,110	59,010
1955	4,760	4,680	5,140	5,480	5,160	6,870	4,950	4,440	3,830	3,820	4,150	4,250	57,530
1956	4,590	4,300	5,080	5,370	4,740	4,920	4,090	3,990	3,630	3,750	4,050	3,920	52,430
1957	4,320	4,410	4,810	4,910	4,920	4,840	4,260	3,950	3,910	3,600	4,380	4,230	52,540
1958	4,920	5,380	5,490	5,280	6,290	6,790	16,960	6,900	3,590	3,860	4,330	4,760	74,550
MEAN	4,998	5,343	5,743	5,848	5,751	6,233	6,594	4,815	4,104	4,109	4,423	4,536	62,497

Fremont River Near Caineville, Utah

Water Year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept	Annual Total
1968	4,010	4,760	5,390	5,810	6,020	5,180	3,230	2,640	2,180	2,440	4,550	2,770	48,990
1969	3,270	4,210	4,100	5,810	4,810	5,840	3,720	3,460	2,580	2,110	3,460	3,220	46,550
1970	3,860	4,740	5,130	5,540	5,330	5,120	3,680	3,670	2,010	2,830	3,100	2,920	48,020
1971	3,410	4,430	4,860	6,060	5,130	5,850	3,700	2,080	1,660	2,990	9,970	4,110	54,270
1972	3,460	5,370	5,640	5,910	5,950	4,990	3,520	1,790	2,370	2,660	1,880	2,760	46,310
1973	4,860	4,910	4,990	4,440	4,630	5,350	12,130	13,100	3,350	2,250	2,950	2,110	65,070
1974	3,360	5,290	6,160	5,740	5,080	5,840	4,010	1,640	1,750	5,580	2,060	2,080	48,600
MEAN	3,761	4,816	5,181	5,616	5,279	5,453	4,856	4,054	2,271	2,980	3,996	2,853	51,116

Muddy Creek Near Emery, Utah

Water Year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept	Annual Total
1965	843	449	430	430	333	563	1,290	5,480	10,980	7,720	3,520	2,390	34,428
1966	1,800	864	684	660	614	1,150	2,030	3,300	2,370	1,880	1,720	733	17,805
1967	575	345	485	435	444	618	466	2,930	5,300	4,230	2,810	1,600	20,238
1968	912	480	411	371	374	489	776	4,790	9,220	4,400	2,610	1,410	26,243
1969	1,120	641	553	553	522	700	2,360	10,120	9,300	5,030	2,440	1,740	35,079
1970	1,880	885	512	675	495	623	1,150	7,820	8,890	5,200	3,540	1,700	33,370
1971	778	793	726	676	595	986	2,340	4,400	6,160	3,520	3,220	1,400	25,594
1972	941	782	657	589	528	889	1,330	2,860	3,230	1,890	1,760	817	16,273
1973	841	617	573	502	444	584	1,890	8,450	9,560	4,700	3,020	1,780	32,961
1974	1,120	723	615	553	526	780	1,650	8,980	7,390	3,370	2,410	1,440	29,527
MEAN	1,081	658	565	544	488	738	1,528	5,913	7,240	4,194	2,705	1,501	27,155

Dirty Devil River, Above Poison Spring Wash

Water Year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept	Annual Total
1965	1,800	3,750	7,630	7,150	6,360	6,720	5,960	4,040	6,500	7,580	8,970	4,160	70,620
1966	4,660	6,210	7,450	7,140	6,030	6,980	4,520	460	20	732	2,290	1,830	48,322
1967	2,830	4,170	4,500	5,010	4,060	4,240	942	2,720	14,740	7,170	2,770	4,200	57,352
1968	3,150	4,800	4,980	4,550	8,470	6,460	3,490	3,150	2,560	5,860	10,460	1,610	59,540
1969	2,410	4,510	5,250	7,660	7,540	9,740	4,920	7,310	6,980	4,700	3,810	5,550	70,380
1970	3,700	5,630	7,060	8,270	7,430	7,510	4,200	3,810	3,570	2,150	3,380	1,730	58,440
1971	3,840	5,590	6,800	5,220	7,300	7,230	3,160	750	190	525	4,210	1,540	46,355
1972	4,160	6,370	4,930	5,600	7,670	5,150	1,350	82	449	1,200	2,520	2,470	41,951
1973	22,420	10,260	6,560	5,460	6,940	10,310	10,400	13,900	7,120	5,770	2,510	2,060	103,710
1974	3,370	7,010	8,600	8,360	8,650	9,910	6,640	3,700	317	1,000	133	764	58,454
MEAN	5,234	5,830	6,377	6,442	7,045	7,425	4,558	3,992	4,245	3,668	4,105	2,591	61,512

Source: USGS, 1974.

APPENDIX II-5

Water Quality of Fremont River

Item	Upper Fremont River (mg/ℓ or as indicated) 1[a] 8-16-73	2[b] 8-16-73	3[c] 8-16-73
Temperature (°C)	17.0	16.0	17.5
Discharge (ft^3/s)	----	13.0	----
Silica (SiO_2)	----	----	----
Iron (Fe)	0	0	0
Calcium (Ca)	18.0	20.0	130.0
Magnesium (mg)	4.0	7.0	40.0
Sodium (Na)	2.0	4.0	21.0
Potassium (K)	1.0	1.0	8.0
Bicarbonate (HCO_3)	85.0	107.0	182.0
Carbonate (CO_3)	0.3	0.47	2.0
Sulfate (SO_4)	3.0	7.0	360.0
Chloride (Cl)	0	2.0	8.0
Fluoride (F)	0.16	0.17	0.25
Nitrite + Nitrate (N)	0.3	0.2	0
Orthophosphate (PO_4)	0.4	0.35	0.05
Nitrate (NO_3)	0.3	0.2	0
Boron (B)	0.01	0.1	0.15
Dissolved Solids (p/m)	84.0	136.0	776.0
Dissolved Tons/acre-feet	----	----	----
Dissolved Tons per day	----	----	----
Hardness (Ca-Mg)	60.0	80.0	490.0
Non Carbonate			
Sodium Adsorption ratio			
Specific Conductance (μmhos)	145.0	195.0	980.0
pH (pH units)	9.0	8.5	8.5

Item	Fremont River Near Caineville 3-14-67[a]	9-12-67[a]	1974-1975[a]
Temperature (°C)	----	----	----
Discharge (ft^3/s)	82.0	47.0	----
Silica (SiO_2)	30.0	27.0	24.0
Iron (Fe)	----	----	1.4
Calcium (Ca)	71.0	136.0	90.0
Magnesium (mg)	28.0	34.0	27.0
Sodium (Na)	20.0	26.0	24.0
Potassium (K)	4.4	6.6	5.1
Bicarbonate (HCO_3)	160.0	202.0	-----
Carbonate (CO_3)	8.0	0	-----
Sulfate (SO_4)	170.0	325.0	214.0

(continued)

APPENDIX II-5 (concluded)

Item	3-14-67	9-12-67	1974-1975
Chloride (Cl)	19.0	24.0	18.0
Fluoride (F)	0.4	0.6	0.21
Nitrite + Nitrate (N)	-----	-----	------
Orthophosphate (PO_4)	-----	-----	------
Nitrate (NO_3)	1.2	0.3	2.0
Boron (B)	0.05	0.10	0.14
Dissolved Solids (p/m)	444.0	737.0	------
Dissolved Tons/acre-feet	0.60	1.0	
Dissolved Tons per day	98.3	93.5	
Hardness (Ca-Mg)	292.0	480.0	334.0
Non Carbonate	148.0	314.0	
Sodium Adsorption ration	0.5	0.5	
Specific Conductance (μmhos)	620.0	952.0	740.0
pH (pH units)	8.4	7.7	7.82

Source: USGS Water Supply Papers

[a]Below Johnson Reservoir on Reservoir Road 94.20 miles above confluence with Muddy Creek

[b]At U-72 bridge NE of Fremont 84.70 miles above confluence with Muddy Creek

[c]South of Loa 73.80 miles above confluence with Muddy Creek

APPENDIX II-6

Water Quality of Dirty Devil River Above Poison Spring Wash

Item	(mg/ℓ or as indicated) 10-6-69	4-27-70	7-28-70	10-22-71	1-12-72	4-11-72
Temperature (°C)	------	------	------	12.5	1.0	17.5
Discharge (ft^3/s)	33.0	20.0	24.0	40.0	108.0	20.0
Silica (SiO_2)	16.0	------	------	22.0	------	25.0
Iron (Fe)	------	------	------	------	------	------
Calcium (Ca)	362.0	219.0	------	260.0	180.0	20.0
Magnesium (mg)	55.0	70.0	------	43.0	43.0	70.0
Sodium (Na)	178.0	220.0	342.0	110.0	140.0	230.0
Potassium (K)	9.9	8.2	14.0	7.7	5.8	8.9
Bicarbonate (HCO_3)	141.0	257.0	-----	156.0	203.0	170.0
Carbonate (CO_3)	0	0	0	0	0	0
Sulfate (SO_4)	1,300.0	810.0	1,720.0	800.0	550.0	840.0
Chloride (Cl)	140.0	194.0	200.0	87.0	130.0	200.0
Fluoride (F)	------	-----	------	0.5	------	0.3
Nitrite + Nitrate (N)	------	-----	------	0.16	0.89	0.01
Orthophosphate (PO_4)	------	-----	------	0.03	0	0.03
Nitrate (NO_3)	------	-----	------	------	------	------
Boron (B)	------	-----	------	140.0	------	170.0
Dissolved Solids (p/m)	2,100.0	1,750.0	2,900.0	1,410.0	1,150.0	1,680.0
Dissolved Tons per acre-feet	2.9	2.24	3.94	1.92	1.56	2.28
Dissolved Tons per day	187.0	97.8	188.0	155.0	335.0	93.0
Hardness (Ca-Mg)	1,130.0	834.0	------	830.0	630.0	840.0
Non Carbonate	1,010.0	623.0	------	70.0	460.0	700.0
Sodium Adsorption ratio	2.3	3.3	------	1.7	2.4	3.5
Specific Conductance (μmhos)	2,400.0	2,220.0	3,150.0	1,820.0	1,620.0	2,260.0
pH (pH units)	7.6	8.2	7.9	7.6	7.9	8.1

Source: USGS Water Supply Papers

APPENDIX II-7

Monthly Sediment Load Fremont River Near Caineville, Utah

Month	(tons or as indicated)						
	Water Year						
	1967	1968	1969	1970	1971	1972	Mean
October	----	1,019	530	1,874	1,318	3,472	1,643
November	----	1,689	1,870	1,939	2,060	2,779	2,067
December	----	5,645	2,637	2,720	1,877	4,835	3,543
Quarterly Total	----	8,353	5,037	6,533	5,255	11,086	7,253
January	----	3,179	8,686	6,060	5,628	3,567	5,424
February	----	4,468	3,105	5,416	3,471	5,354	4,363
March	----	775	4,713	2,798	3,298	3,576	3,032
Quarterly Total	----	8,422	16,504	14,274	12,397	11,497	12,819
April	98	550	1,271	729	814	487	658
May	14,561	1,589	10,593	2,870	562	86	5,040
June	7,696	3,004	51,322	427	397	-----	12,569
Quarterly Total	22,355	5,143	63,186	4,026	1,773	----	18,267
July	33,356	24,484	64,240	5,667	7,185	-----	26,986
August	37,929	54,039	110,121	29,392	126,668	-----	71,630
September	47,744	664	155,450	570	18,162	-----	44,518
Quarterly Total	119,029	79,187	329,811	35,629	152,015	-----	143,134
Annual Total	-------	101,105	414,538	60,462	171,440	-----	181,473
Annual Total (Acre-Feet)[a]	-------	77	317	46	131	-----	140

Source: USGS Water supply Paper, 1974.

[a]Assumed sediment weight - 60 lb/ft^3

APPENDIX II-8
Springs, Seeps, and Wells in Potential Area of Impact to Ground Water

Springs		Location
1.	Sand Flat Spring	Sec. 17, T. 25 S., R. 6 E.
2.	Solomon Creek Seeps	Sec. 28, T. 25 S., R. 5 E.
3.	Desert Seep	Sec. 27, T. 25 S., R. 6 E.
4.	Birch Spring (private)	Sec. 11, T. 26 S., R. 5 E.
5.	Rock Spring (private)	Sec. 15, T. 26 S., R. 5 E.
6.	Black Mountain Seep	Sec. 24, T. 26 S., R. 6 E.
7.	Camper's Spring	Sec 17, T. 27 S., R. 7 E.
8.	Unnamed Seep	Sec. 14, T. 27 S., R. 7 E.
9.	Coral Canyon Seep	Sec. 6, T. 27 S., R. 8 E.
10.	Unnamed Seep	Sec. 6, T. 27 S., R. 8 E.
11.	Caine Spring	Sec 11, T. 27 S., R. 8 E.
12.	Unnamed Seep	Sec 6, T. 27 S., R. 7 E.,
13.	Andrews Water Seep	Sec. 4, T. 28 S., R. 8 E.
14.	Unnamed	Sec. 4, T. 28 S., R. 8 E.
15.	Willow Seep	Sec. 5, T. 28 S., R. 8 E.
16.	Rock Water	Sec. 11, T. 28 S., R. 7 E.
17	Poison Water	Sec. 7, T. 28 S., R. 8 E.
18	Sand Spring	Sec. 25, T. 28 S., R. 7 E.
19	Seismo Seep	Sec. 7, T. 29, R. 8 E.
20	Cottonwood Spring	Sec. 31, T. 30 S., R. 8 E.
21.	Burro Spring	Sec. 32, T. 30 S., R. 8 E.
22	Five-Mile Spring	Sec. 1, T. 31 S., R. 7 E.
23.	Bank Spring	Sec. 7, T. 31 S., R. 8 E.
24.	Red Seeps Spring	Sec. 23, T. 32 S., R. 7 E.

APPENDIX II-8 (concluded)

Wells	Location
1. Dry Valley	Sec. 36, T. 29 S., R. 11 E.
2. Sandy Ranch	Sec. 36, T. 31 S., R. 7 E.
3. Stanolind (Red Desert)	Sec. 29, T. 28 S., R. 8 E.
4. Last Chance	Sec. 6, T. 26 S., R. 8 E.

Note: Numbers are keyed to Figure 2-11.

APPENDIX II-9

Quality of Water From the Navajo Sandstone

Well Name	(parts per million or as indicated)				
	OW-1A	OW-ICPA	OW-Stano-lind	TW-1	OW-Colt
Number of Samples Analyzed	1	3	2	22	8
Temperature °C Field	----	20.1	17.6	17.5	17.3
Specific Electrical Conductance ($KX10^6$)	998.0	3,997.0	2,990.0	4,315.0	1,494.0
pH Lab. (pH units)	7.97	7.63	7.62	7.81	7.71
Calcium	128.0	259.0	136.0	84.0	102.0
Magnesium	49.0	105.0	46.0	30.0	56.0
Total Hardness as $CaCO_3$	520.0	1,075.0	530.0	332.0	469.0
Sodium	18.0	495.0	475.0	823.0	151.0
Potassium	3.1	4.8	4.2	4.0	5.3
Alkalinity as $CaCO_3$ (Total)-Lab.	230.0	197.0	248.0	237.0	211.0
Sulfate	304.0	1,022.0	652.0	600.0	356.0
Chloride	7.1	623.0	454.0	847.0	180.0
Silica	13.0	12.0	8.5	9.6	9.4
Iron	3.2	0.8	-----	0.54	1.0
Boron	0.03	0.30	-----	0.37	0.04
Fluoride	0.21	0.54	-----	0.9	0.17
Nitrate	0.4	0.20	0.9	0.4	LT 1.0
Nitrite	-----	0.002	-----	-----	-----
Total Kjeldahl Nitrogen	0.10	-----	-----	0.07	0.03
Phosphate	-----	0.2	0.03	-----	-----
Total Dissolved Solids	690.0	2,823.0	2,008.0	2,568.0	1,135.0

Source: City of Los Angeles, DWP

APPENDIX II-10

Representative Species in Each Vegetation Type

Cold Desert Vegetation Type

Common Name	Scientific Name
Sagebrush	Artemesia spp
Saltbush	Atriplex spp.
Rabbitbrush	Chrysothamnus spp.
Brigham tea	Ephedra spp.
Winterfat	Eurotia lanata
Galleta grass	Hilaria jamesii
Indian rice grass	Oryzopsis hymenoides
Greasewood	Sarcobatus vermiculatus
Globe mallow	Sphaeralcea spp

Hot Desert Vegetation Type

Common Name	Scientific Name
Bursage	Ambrosia spp.
Wild buckwheat	Eriogonum spp.
Galleta grasses	Hilaria spp.
Creosote bush	Larrea tridentata
Cholla	Opuntia spp.
Mesquite	Prosopis juliflora
Joshua tree	Yucca brevifolia

Riparian Vegetation Type

Common Name	Scientific Name
Alder	Alnus spp.

Mountain Brush Vegetation Type

Common Name	Scientific Name
Cottonwood	*Populus* spp.
Willow	*Salix* spp
Tamarisk (salt cedar)	*Tamarix* spp.
Serviceberry	*Amelanchier alnifolia*
Big sagebrush	*Artemesia tridentata*
Mountain mahogany	*Cercocarpus* spp.
Indian ricegrass	*Oryzopsis hymenoides*
Chokecherry	*Prunus virginiana*
Bitterbrush	*Purshia tridentata*
Oak	*Quercus* spp.
Needle-and-thread grass	*Stipa comata*

Pinyon-Juniper Vegetation Type

Common Name	Scientific Name
Sagebrush	*Artemesia* spp.
Cheatgrass	*Bromus tectorum*
Mountain mahogany	*Cercocarpus* spp.
Galleta grass	*Hilaria jamesii*
Juniper	*Juniperus* spp.
Beardtongue	*Penstemon* spp.
Pinyon pine	Pinus spp.

Forest Vegetation Type

Common Name	Scientific Name
Fir	*Abies* spp.
Indian paintbrush	*Castilleja* spp.
Indian ricegrass	*Oryzopsis hymenoides*
Ponderosa pine	*Pinus ponderosa*
Quaking aspen	*Populus tremuloides*
Douglas fir	*Pseudotsuga menziesii*
Blueberry	*Vaccinium* spp.

Chaparral Vegetation Type

Common Name	Scientific Name
Chamise	*Adenostoma fasciculatum*
Manzanita	*Arctostaphylos* spp.
Birch-leaf mountain mahogany	*Cercocarpus betuloides*
Oak	*Quercus dumosa*

APPENDIX II-11

Threatened and Endangered Plant Species
Within the Salt Wash Regional Setting

Officially Listed

None

Proposed Endangered (Federal Register, June 16, 1976)

Astragalus harrisonii
Astragalus loanus
Astragalus serpens
Castilleja aquariensis
Erigeron kachinensis
Erigeron maguirei
Eriogonum cronquistii
Eriogonum smithii
Gaillardia flava
Gilia caespitosa
Najas caespitosus
Parthenium ligulatum
Phacelia indecora
Sclerocactus wrightiae
Zigadenus vaginatus

Candidate[a] - (T) = Threatened (E) = Endangered

Asclepias cutleri (T)
Asclepias ruthiae (T)
Astragalus barnebyi (T)
Astragalus callithrix (E)
Astragalus castaneiformis var. *consobrinus* (T)
Astragalus henrimontanensis (T)
Astragalus monumentalis (T)
Astragalus raphaelensis (T)
Cryptantha johnstonii (E)
Cryptantha jonsiana (T)
Eriogonum ostlundii (T)
Euphorbia nephradenis (T)
Hymenopappus filifolius var. *tomentosus* (T)
Lomatium latilobum (T)
Machaeranthera glabriuscula var. *confertiflora* (T)
Penstemon parvus (T)
Phacelia utahensis (T)

[a]The Great Basin Naturalist Vol. 38, No. 1 March 31, 1978 "Endangered and Threatened Plants of Utah: A Reevaluation", Stanley L. Welsh, PhD

APPENDIX II-12

Threatened and Endangered Plant Species
Which Occur Along Proposed Transmission Routes

UTAH

Officially Listed

None

Proposed Endangered (Federal Register, June 16, 1976)

Arctomecon humilis
Astragalus loanus
Echinocereus englemannii var. *purpureus*

Candidate[a] (T) = Threatened (E) = Endangered

Eriogonum thompsonae var. *thompsonae* (T)
Lupinus jonesii (T)
Phacelia cephalotes (T)

ARIZONA

Officially Listed

None

Proposed Endangered (Federal Register, June 16, 1976)

Arctomecon humilis
Psoralea epipsila

Candidate (T) = Threatened

Astragalus geyeri var. *triquetris* (T)
Eriogonum heermannii var. *subracemosum* (T)

NEVADA

Officially Listed

None

Proposed Endangered (Federal Register, June 16, 1976)

Arctomecon merriamii
Astragalus nyensis
Mentzelia leucophylla

APPENDIX II-12 (concluded)

NEVADA (continued)

Candidate (T) = Threatened

- Astragalus convallarius var. finitimus (T)
- Astragalus lentiginosus var. latus (T)
- Astragalus oophorus var. lonchocalyx (T)
- Cryptantha tumulosa (T)
- Penstemon bicolor ssp. bicolor (T)
- Penstemon bicolor ssp. roseus (T)
- Phacelia anelsonii (T)

CALIFORNIA

Officially Listed

None

Proposed Endangered (Federal Register, June 16, 1976)

- Chorizanthe spinosa
- Eriophyllum mohavense
- Forsellesia pungens var. glabra

Candidate (For either threatened or endangered status)

- Astragalus cimae var. cimae
- Bouteloua simplex
- Eriogonum heermannii var. floccosum
- Fendlerella utahensis
- Festuca arizonica
- Muhlenbergia arsenei
- Oryzopsis micrantha
- Stipa arida
- Tridens pilosus

[a] The Great Basin Naturalist, Vol. 38, No. 1 March 31, 1978. "Endangered and Threatened Plants of Utah: A Reevaluation", Stanley L. Welsh, PhD

APPENDIX II-13

[a]List of Principal and Observed Animals
at the Salt Wash Plant Site and Along the Fremont River

Common Name	Scientific Name
MAMMALS	
Badger	Taxidea taxus
Coyote	Canis latrans
Gray Fox	Urocyon cinereoargenteus
Yellowbelly marmot	Marmota flaviventris
Whitetail antelope squirrel	Ammospermophilus leucurus
Rock Squirrel	Spermophilus variegatus
Great Basin pocket mouse	Perognathus parvus
Beaver	Castor canadensis
Canyon mouse	Peromyscus crinituss
Deer mouse	Peromyscus maniculatus
Desert woodrat	Neotoma lepida
Sagebrush vole	Lagurus curtatus
Muskrat	Ondatra zibethica
Porcupine	Erethizon dorsatum
Blacktail jackrabbit	Lepus californicus
Desert cottontail	Sylvilagus audoboni
Mule deer	Odocoileus hemionus
BIRDS	
White-faced Ibis	Plegadis chihi
Snowy egret	Egretta (leucophoyx) thula
Great blue heron	Ardea herodias
Sora	Porzana carolina
Spotted sandpiper	Actitus macularia
Killdeer	Charadrius vociferus
Mallard	Anas platyhynchos
Blue-winged teal	Anas discors
Cinnamon teal	Anas cyanoptera
Red-tailed hawk	Buteo jamaicensis
Rough-legged hawk	Buteo lagopus
Ferruginous hawk	Buteo regalis
American kestrel	Falco sparverius
Sharp-shinned hawk	Accipiter striatus
Cooper's hawk	Accipiter cooperii
Northern harrier	Circus cyaneus
Golden Eagle	Aquila chrysaetos
Osprey	Pandion haliaetus
Gambel's Quail	Lophortyx gambelii
Chukar	Alectoris graeca
Afghan white-winged pheasant	Phasianus cholchicus
Mourning dove	Zenaidura macrouraenaida
Belted kingfisher	Megaceryle alcyon
Common flicker	Colaptes auratus
Western kingbird	Tyrannus verticalis
Ashthroated flycatcher	Myiarchus cinerascens

Say's phoebe	Sayornis saya
Horned lark	Eremophila alpestris
Barn swallow	Hirundo rustica
Tree swallow	Tridoprocne bicolor
Violet-green swallow	Tachycineta thalassina
Rough-winged swallow	Stelgidopteryx ruficollis
Scrub jay	Aphelocoma coerulescens
Black-billed magpie	Pica pica
Northern raven	Corvus corax
North American Dipper	Cinclus mexicanus
House wren	Troglodytes aedon
Rock wren	Salpinctes obsoletus
Sage thrasher	Oreoscoptes montanus
Black-tailed gnatcatcherher	Polioptila melanura
American robin	Turdus migratorius
Water pipit	Anthus spinoletta
Loggerhead shrike	Lanius ludovicianus
Starling	Sturnus vulgaris
Black-throated warbler	Dendroica igrescens
Yellow warbler	Dendroica petechia
Common yellowthroat	Geothlypis trichas
Wilson's warbler	Wilsonia pusilla
MacGillivray's warbler	Oporornis tolmiei
Western meadowlark	Sturnella neglecta
Yellow-headed blackbird	Xanthocephalus xanthocephalus
Brown-headed cowbird	Molothrus ater
Red-winged blackbird	Agelaius phoeniceus
Golden-crowned kinglet	Regulus strapa
Lazuli bunting	Passerina amoena
Cassin's finch	Carpodacus cassinii
American Goldfinch	Spinus tristis
Green-tailed towhee	Chlorura chlorura
Lark sparrow	Chondestes grammacus
Chipping sparrow	Spizella passerina
White-crowned sparrow	Zonotrichia leucophrys
Song sparrow	Melospiza melodia
Vesper sparrow	Pooectes gramineus
REPTILES	
Leopard lizard	Crotaphytus wislizenii
Desert spiny lizard	Sceloporous magister
Side-blotched lizard	Uta stansburiana
Western whiptail	Cnemidophorus tigris
AMPHIBIANS	
None observed	

[a]These are typical of the primary project area. Other species may range into the area, but were not seen nor trapped during the Westinghouse, 1977, studies.

APPENDIX II-14

Definition of Visual Resource Management Terms

VISUAL ZONES

Foreground-Middleground (FMg)

This is an area that can be seen from travel routes or use areas for a distance of 3 to 5 miles. Management activities can be seen in detail. The outer boundary of this zone is defined as the point where texture and form of individual plants is no longer apparent in the landscape.

Background

This is the remaining area which can be seen, within about 15 miles, from travel routes or use areas. Vegetation can be discerned at least as patterns of light and dark.

Seldom Seen

These are areas that are beyond the background zone or cannot be seen from travel routes or use areas, or can be seen from low use transportation routes only.

SCENIC QUALITY

Class A

Areas in which land form, water form, and vegetative patterns are of unusual or outstanding visual quality.

Class B

Areas in which features contain variety, but are not outstanding. Areas lack dominating features.

Class C

Areas in which features have little variety and become monotonous.

SENSITIVITY LEVELS

High Sensitivity

Public concern for quality of the visual resource is major.

Medium Sensitivity

Public concern for quality of the visual resource is secondary.

Low Sensitivity

Public concern for quality of the visual resource is minor.

(Criteria weighed for determining visual sensitivity includes existing and proposed land uses, use levels, community attitudes, and agency attitudes. VRM assumes that unaltered land has greater scenic value.)

MAGNITUDE OF MAN-MADE CONTRAST

Low

Contrast will not attract attention from the landscape character.

Medium

Contrast attracts attention and begins to dominate landscape character.

High

Contrast demands attention, will not be overlooked, and dominates the landscape character.

APPENDIX II-15

Definitions of Farmlands

Prime Farmlands

Prime farmland is land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops, and is also available for these uses (the land could be cropland, pastureland, rangeland, forest land, or other land, but not urban built-up land or water). It has the soil quality, growing season, and moisture supply needed to economically produce sustained high yields of crops when treated and managed, including water management, according to acceptable farming methods. In general, prime farmlands have an adequate and dependable water supply from precipitation or irrigation, a favorable temperature and growing season, acceptable acidity or alkalinity, acceptable salt and sodium content, and few or no rocks. They are permeable to water and air. Prime farmlands are not excessively erodible or saturated with water for a long period of time, and they either do not flood frequently or are protected from flooding. Examples of soils that qualify as prime farmland are Palouse silt loam, 0 to 7 percent slopes; Brookston silty clay loam, drained; and Tama silty clay loam, 0 to 5 percent slopes.

Unique farmland

Unique farmland is land other than prime farmland that is used for the production of specific high value food and fiber crops. It has the special combination of soil quality, location, growing season, and moisture supply needed to economically produce sustained high quality and/or high yields of specific crop when treated and managed according to acceptable farming methods. Examples of such crops are citrus, tree nuts, olives, cranberries, fruit, and vegetables.

Farmland of Statewide Importance

This is land, in addition to prime and unique farmlands, that is of statewide importance for the production of food, feed, fiber, forage, and oilseed crops. Criteria for defining and delineating this land are to be determined by the appropriate state agency or agencies. Generally, additional farmlands of statewide importance include those that are nearly prime farmland and that economically produce high yields of crops when treated and managed according to acceptable farming methods. Some may produce as high a yield as prime farmlands if conditions are favorable. In some states, additional farmlands of statewide importance may include tracts of land that have been designated for agriculture by state law.

Source: Soil Conservation Service, 1978.

APPENDIX II-16
Wilderness Inventory Procedures

The Federal Land, Policy and Management Act of 1976 (FLPMA) directs that public land roadless areas of 5,000 acres or more under jurisdiction of the BLM be reviewed for wilderness values as defined by Congress in Sec. 2(c) of the Wilderness Act. Within 15 years, the lands reviewed must be recommended to the President of the United States as suitable or non-suitable for wilderness designation by Congress. FLPMA also mandates BLM to manage lands that are being reviewed so that their suitability for wilderness designation is not impaired.

BLM's statewide wilderness review officially began in December, 1978. The wilderness review program contains the following components:

1. Inventory of Roadless Units:
   Roadless units (areas of 5,000 or more acres of contiguous public land bounded by a road or non-public land) are inventoried for wilderness character.

   a. Initial inventory roadless units determined to "clearly and obviously" lack wilderness character because of lack of naturalness are eliminated from further wilderness review and are no longer subject to interim management protection. This phase is scheduled for completion approximately in July of 1979.

   b. Intensive Inventory Roadless Units determined to possess wilderness character are identified as Wilderness Study Areas (WSAs). Areas determined not to possess wilderness character are eliminated from further wilderness review and are released from interim management protection. This phase is scheduled for completion approximately in September of 1980.

2. Study and Reporting of Wilderness Study Areas:
   Each wilderness Study Area is evaluated in BLM's land use planning system to compare its wilderness values to other resource values in order to determine whether the WSA is more suitable for wilderness or for other uses. By October 8, 1991 all WSAs must be recommended to the President as suitable or non-suitable for wilderness designation by Congress.

3. Study and Reporting of Instant Study Areas:
   Instant Study Areas are fifty-five public land areas which were formally designated as "natural" or "primitive" areas prior to November 1, 1975. They are called "Instant Study Areas" because they are already identified and need not go through the inventory process. FLPMA requires recommendation to be reported to the President by July 1, 1980.

APPENDIX II-17
Description of Accelerated IPP Wilderness Inventory

BLM administered lands that would be directly affected by the Intermountain Power Plant's proposed and alternate facilities were inventoried (initial and intensive) for wilderness values in advance of the Bureau's general wilderness inventory mandated by FLPMA. The Secretary of the Interior granted special approval to complete the accelerated IPP wilderness inventory in a memorandum dated August 20, 1978. BLM administered lands in Arizona, Nevada and Utah were involved in the inventory.

In California, BLM administered lands that would be affected by the IPP facilities are part of the California Desert Conservation Area (CDCA) and were already undergoing an accelerated wilderness inventory at the time approval was granted for the IPP inventory. (Special Approval for the CDCA Inventory had been granted by the Secretary of the Interior, April 19, 1978.)

The IPP accelerated wilderness inventory was conducted in September and October of 1978 by teams of at least two members, provided by BLM's district offices in the states involved. Roadless units of 5,000 or more acres of contiguous public land bounded by roads or non-public land were inventoried for wilderness character as defined in Section 2(c) of the Wilderness Act of 1964 (i.e., containing naturalness and outstanding opportunity for solitude or unconfined recreation). These essential wilderness character criteria were discussed in narrative form for each roadless unit. Naturalness was determined by air and ground inventory of man-made intrusions. The opportunity for solitude was judged, based upon topography and vegetation within the inventory unit. Unconfined recreation opportunities were documented. Ecological, geological, scientific, educational or historical values were also documented.

In Moab District, Utah, only the "influence corridor" portion of eight roadless units identified along the proposed Salt Wash to Emery powerline and railroad routes was inventoried. An "influence corridor" was defined for this study as that area where the proposed action, if completed, would become the dominant intrusion in a natural landscape. Because of public concern over the "influence corridor" method, the eight roadless units involved are being reinventoried in the statewide wilderness inventory.

Public meetings were held according to the following schedule:

State	District	Location of Meeting	Date
Arizona	Arizona Strip	Cedar City	11/15/78
Nevada	Las Vegas	Las Vegas	11/13/78
	Ely	Ely	11/14/78
		Reno	11/16/78
		Caliente	11/15/78
Utah	Richfield	Delta	11/14/78
		Castledale	11/16/78
	Moab	Castledale	11/16/78
	Cedar City	Cedar City	11/15/78
		Salt Lake City	11/17/78

At the public meetings, BLM personnel involved in the Wilderness Inventory reported inventory findings and made Wilderness Study Area (WSA) recommendations. Public comment was received at the meetings, and written comment was received until February 16. (California held public open-houses and public meetings

throughout the State 12/4/78 through 12/15/78 as part of the CDCA Inventory.) Most WSA determinations were finalized by State Director approval by March 15, 1979.

Eight proposed WSAs in Nevada are presently undergoing an additional public comment period, and their boundaries are not yet final. A summary of the inventory findings is shown in Table 1.

Documentation of the IPP accelerated wilderness inventory and public comments concerning the inventory are available at the Bureau of Land Management, Richfield District Office, Richfield, Utah 84701. A map and summary document is being prepared by BLM's Utah State Office depicting all of the roadless inventory units and resulting WSAs identified in the inventory, and is scheduled for release April 15, 1979.

APPENDIX II-17 (continued)

TABLE 1

Roadless Units Inventoried	Roadless Units Not Having Wilderness Character[a]	Roadless Units to be Inventoried or Reinventoried	Wilderness Study Areas
		ARIZONA	
5	1	0	1. AZ-010-004-UT-040-057
		NEVADA	
		2	1. South Egan Range[b] NV-040-168
			2. Mt. Grafton[b] NV-040-169
			3. Far South Egans[b] NV-040-172
			4. Fortifications[b] NV-040-177
			5. Parsnip Peak[b] NV-040-206
			6. Delamar Mountains[b] NV-050-IPP-07
			7. Arrow Canyon Range NV-050-IPP-09
			8. Muddy Mountains[b] NV-050-IPP-15
			9. McCullough Mountains[b] NV-050-IPP-17
		UTAH	
111	96	8	1. AZ-010-004-UT-040-057
			2. UT-040-046
			3. Notch Peak UT-050-78

APPENDIX II-17 (concluded)

TABLE 1 (concluded)

Roadless Units Inventoried	Roadless Units Not Having Wilderness Character[a]	Roadless Units to be Inventoried or Reinventoried	Wilderness Study Areas
			4. Little Sahara-Rockwell UT-050-186
			5. King Top UT-050-070
			6. Howell Peak UT-050-077
			8. Conger Mountain UT-050-035

[a]Three of the roadless units inventoried in Nevada were Instant Study Areas (ISAs) and their contiguous roadless acreage:
Swamp Cedar Instant Study Area (NV-040-089),
Pygmy Sage Instant Study Area (NV-040-099),
and Shoshone Ponds Instant Study Area (NV-040-180).
Intensive inventory documented the lack of wilderness character in all three units, but the Bureau must protect these areas from significant physical disturbance until Congress acts on the wilderness recommendations of non-suitable for wilderness preservation.

[b]Proposed WSAs presently undergoing additional public comment. Boundaries are not yet final.

APPENDIX III-1
Discussion of Air Quality Models

The Utah Bureau of Air Quality used the EPA Valley model to estimate particulate and sulfur dioxide concentrations in the vicinity of the proposed IPP plant.The EPA developed the Valley model for point sources positioned in complex terrain (ERT, 1977). The model is recommended to be used when the elevation of receptor locations of interest are of equal elevation to, or greater than, the elevation of the effective stack height (stack height plus plume rise) for one or more of a plant's stacks during stable atmospheric conditions and 4 mile per hour winds. The model is specifically to estimate 24-hr pollutant concentrations attributable to a source.

Based upon a modified Gaussian plume equation, the calculations follow procedures adapted from Turner (1970). In view of the uncertainties which are inherent in modeling of the transport and dispersion of stack plumes in complex terrain, several simplifying assumptions have been introduced which reduce the model's sensitivity to diffusion parameters (e.g., the horizontal diffusion parameter sigma y is eliminated). The major assumptions in the model are:

The height of the plume centerline above the ground is decreased by the elevation of the receptors above the base of the stack.

The pollutant is uniformly distributed in the horizontal over a 22.5 degree sector.

The plume centerline is never less than 10 meters from the ground.

The model is discussed in detail in EPA's "A Users Guide to the Valley Model" presently in draft (EPA, 1977).

Environmental Research and Technology (ERT), in addition to the Valley Model, used a Gaussian point source diffusion model for continuous sources they call PSDM. Long-term and short-term pollutant concentrations are computed at each point on a polar grid. PSDM was used to calculate concentrations due to emission from the plant during each of 768 weather conditions, eight stabilities, times six wind speeds, times 16 wind directions. The report entitled "Assessment of the Air Quality Impact Project" discusses the model, equations incorporated, and results (ERT, 1977).

The H. E. Cramer Co. used long-term and short-term diffusion models which are modified versions of the Gaussian plume model. In the short-term model, the plume is assumed to have Gaussian vertical and lateral distributions. The long-term model is a sector model similar to the EPA's Climatological Dispersion Model in which the vertical concentration distribution assumed to be gaussian and the lateral distribution within a sector rectangular (a smoothing function is used to eliminate sharp discontinuities at the sector boundries). The sigma z vertical expansion curves and sigma y lateral expansion curves are determined by using turbulent intensities in simple power-law expressions that include the effects of initial source dimensions. In both the short-term and long-term models, buoyant plume rise is calculated by the Briggs (1971) plume-rise formulas. An exponent law is used to adjust the surface wind speed to the source height for plume-rise calculations and to the plume stabilization height for concentration calculations. Both the short-term and the long-term models contain provisions to account for effects of complex terrain. The

report entitled "Assessment of the Air Quality Impact of Emissions from the Proposed Intermountain Power Project Power Plant at the Primary and Three Alternate Sites" discusses the model, equations incorporated, and results (Cramer, et al., 1977).

The Westinghouse Environmental Systems Division employed a modified version of the EPA 24-hr model (CRSI) to calculate ground level concentrations. This model accounts for plume dispersion near elevated terrain. The model used the Gaussian equation for unlimited mixing and a trapping equation under limited mixing conditions. The Briggs plume rise equations were used to calculate effective plume height. Meteorological conditions at the proposed site were determined from 331 days of hourly data from the IPP meterological tower discussed in Chapter 2. Morning and afternoon mixing heights were computed from temperature soundings at the Salt Wash site and the National Weather Service Station at Grand Junction, Colorado. The horizontal dispersion was determined from measurements of the standard deviation of wind direction at 100 meters; vertical dispersion was determined from meteorological tower measurements of the change in temperature between 10 and 100 meters. These measurements were then related to the Pasquill stability classifications. This method of catagorizing the horizontal and vertical dispersion parameters separately is commonly referred to as the split sigma technique. A full discussion of the model and equations incorporated in it is given in the report entitled "Intermountain Power Project Preliminary Engineering and Feasibility Study--Environmental Assessment" Volume 5 Part 3 Appendix 3.1.4A.

APPENDIX III-2

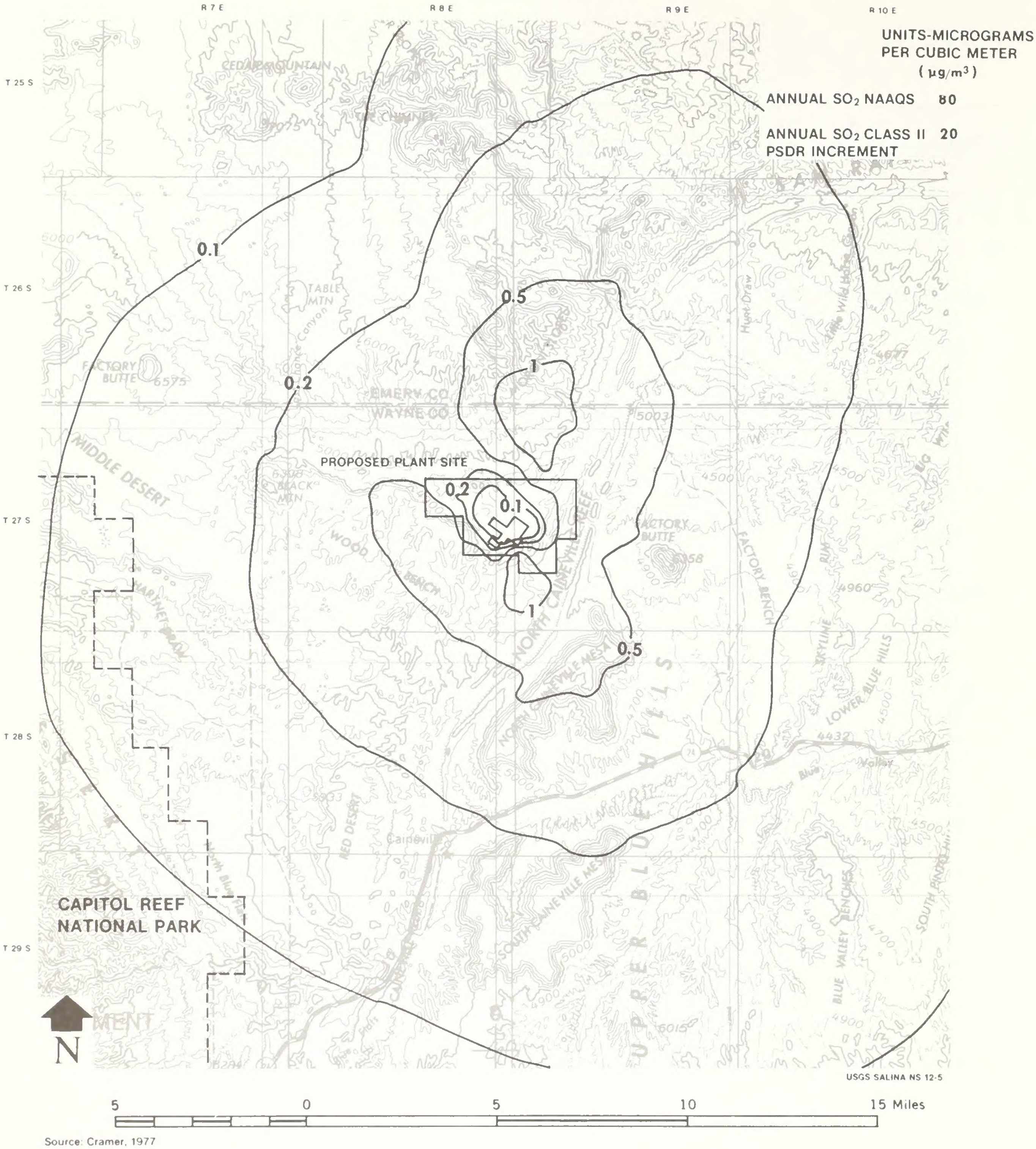
Stack and Emissions Data for the
IPP Power Plant

Parameter	Parameter Value for Each Stack[a]
Stack Height	
(m)	229
(ft)	750
Stack Inner Diameter[b]	
(m)	12.9
(ft)	42.4
Volumetric Emission Rate	
(m^3/sec)	2,401
(acfm)	5,088,000
Stack Exit Temperature	
(°K)	350
(°F)	170
Stack Exit Velocity	
(m/sec)	18
(ft/sec)	60
SO_2 Emission Rate (g/sec)	
Maximum 3-Hour	232.0 (22.1 tons/day)
Maximum 24-Hour	207.5 (39.5 tons/day)
Annual Average	155.6 (14.8 tons/day)
Particulate Emission Rate (g/sec)	
Maximum 24-Hour	27.9 (2.8 tons/day)
Annual Average	22.4 (2.15 tons/day)
NOx Emission Rate (g/sec)	
Annual Average	1,122.0 (106.9 tons/day)

Source: Cramer, et al., 1978a.

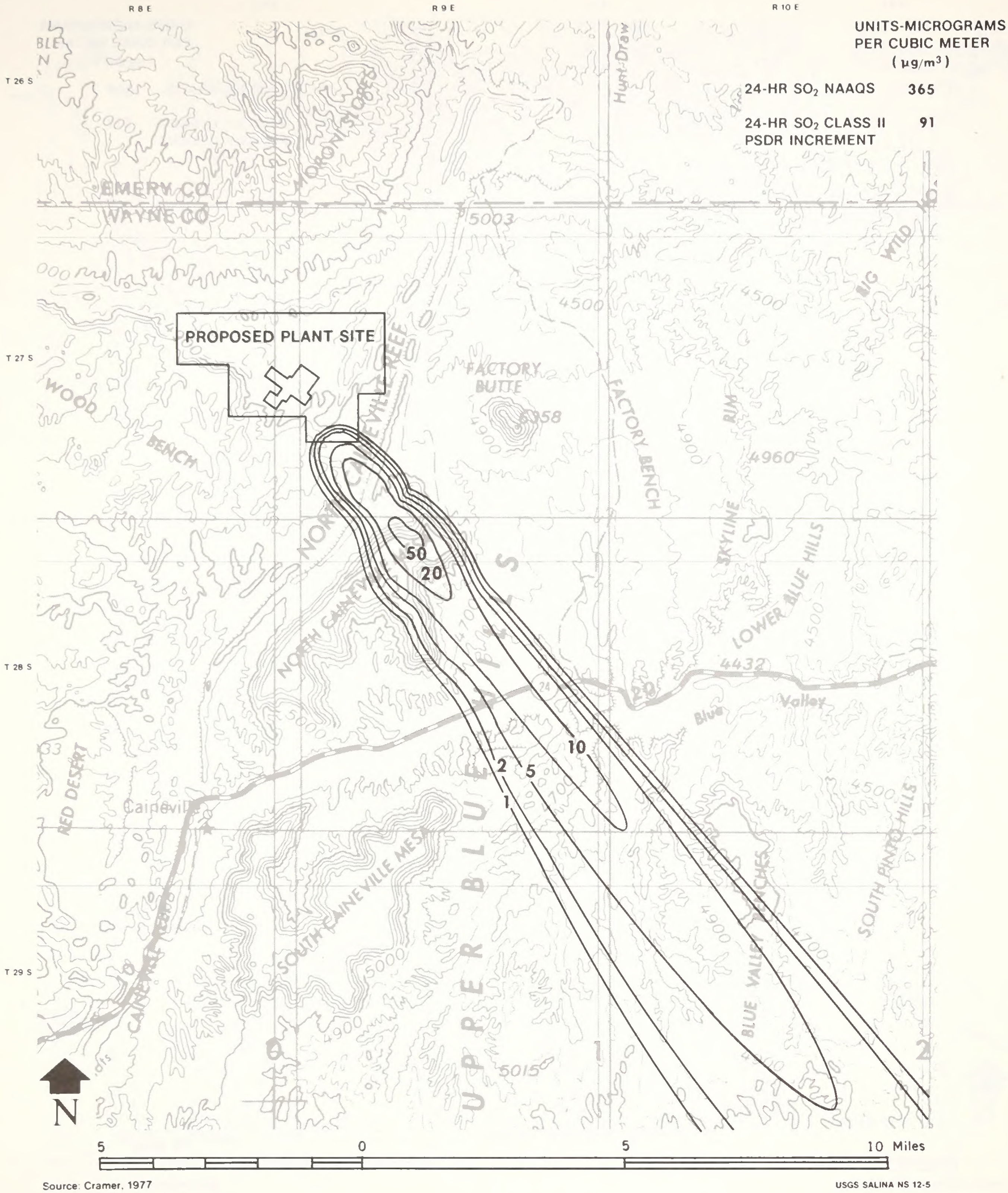
[a]Emission parameters, except for annual average pollutant emission rates, are for full-load operation. The annual average pollutant emission rates correspond to 85 percent of full-load operation.

[b]Effective diameter for two inner flues with diameters of 9.1 meters.



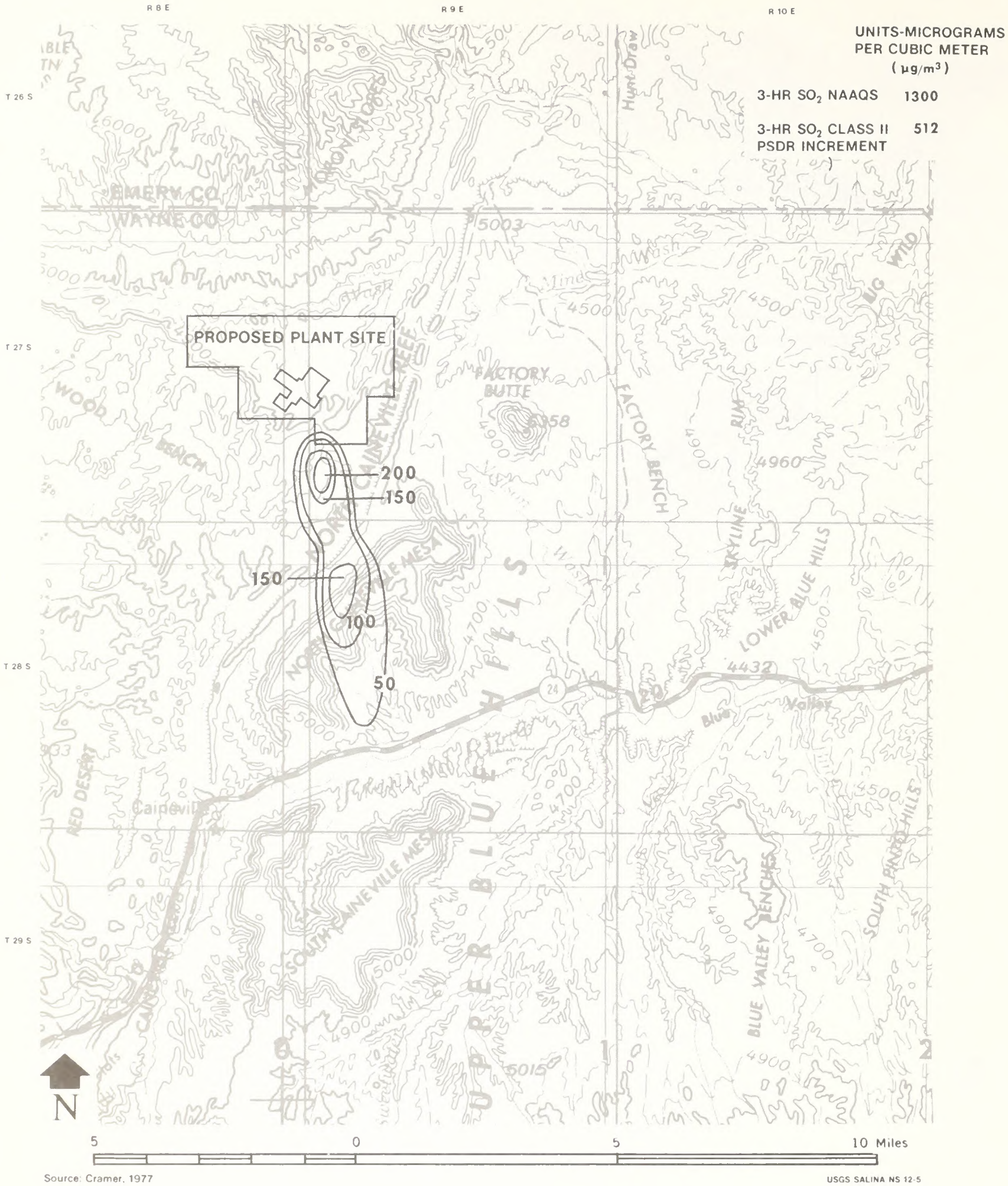
CALCULATED ISOPLETHS
ANNUAL AVERAGE GROUND-LEVEL SO_2 CONCENTRATIONS

FIGURE 1



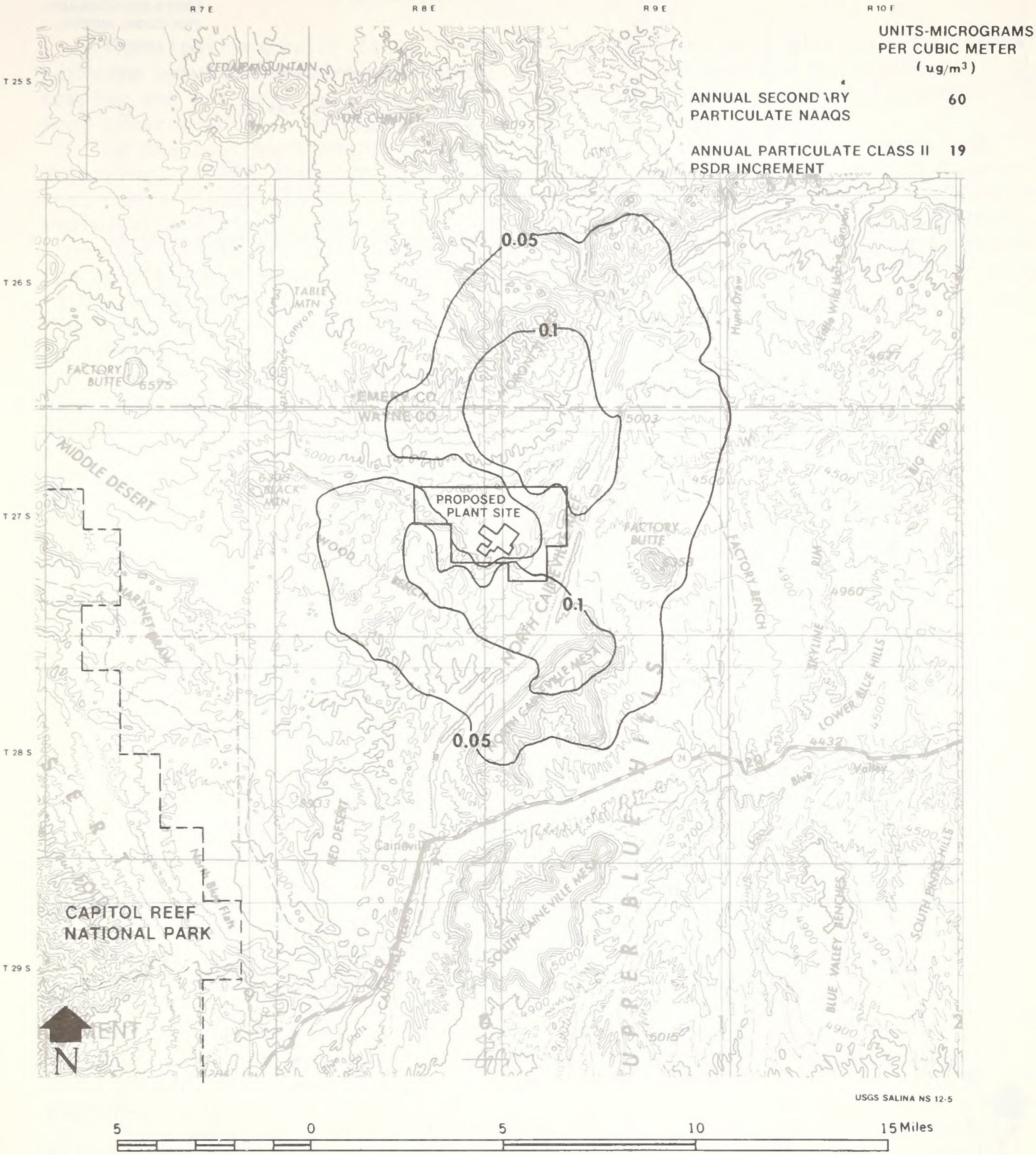
CALCULATED ISOPLETHS
MAXIMUM 24-hr AVERAGE GROUND-LEVEL SO_2 CONCENTRATIONS

FIGURE 2



CALCULATED ISOPLETHS
MAXIMUM 3-hr AVERAGE GROUND-LEVEL SO_2 CONCENTRATIONS

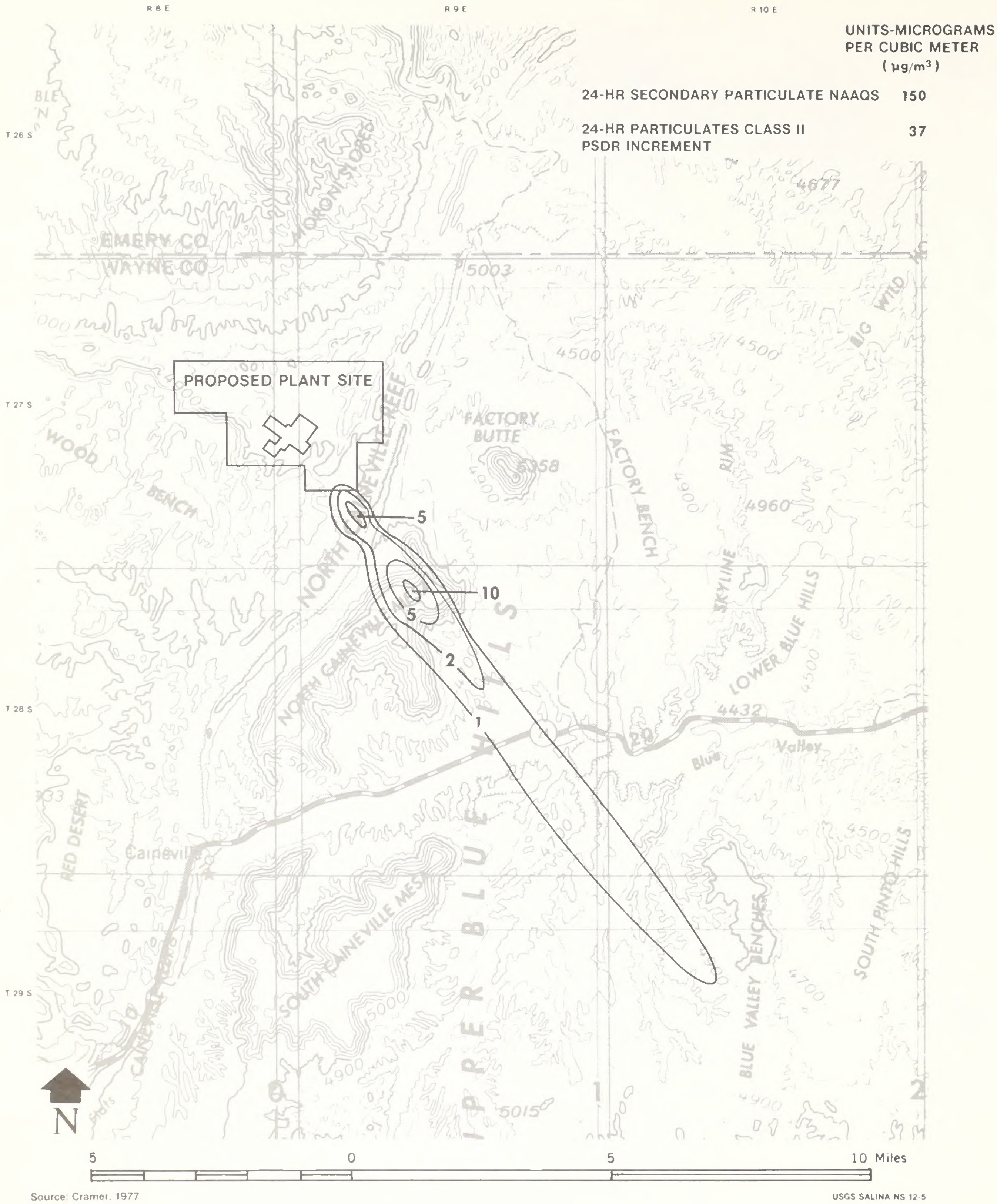
FIGURE 3



Source: Cramer, 1977

CALCULATED ISOPLETHS
ANNUAL AVERAGE GROUND-LEVEL PARTICULATE CONCENTRATIONS

FIGURE 4



CALCULATED ISOPLETHS
MAXIMUM 24-hr AVERAGE GROUND-LEVEL PARTICULATE CONCENTRATIONS

FIGURE 5

APPENDIX III-4
Significance of Trace Elements

The significance of trace element deposition has been difficult to assess. Pathways by which trace elements are distributed through the ecosystem are complex and not well defined. The long-term accumulation of trace elements from power plants is not well known.

In the Southwest Energy Study, the concentration of trace elements was determined around the Four Corners power plant near Fruita, New Mexico (Southwest Energy Study, 1972). Soils and vegetation samples were taken in a 25-mile radius of the plant. The trace element concentrations of the soils samples were compared to the concentrations found in average U.S. soils. Barium was the only trace element in higher concentrations than the U.S. average. Mercury values were below the limits of detection outside a 2-mile radius of the plant and all mercury values were below the 0.11 p/m reported by Swaine (1955) for an average U.S. soil.

The conclusion of the trace elements portion of the Southwest Energy Study was that the effect of trace elements from Four Corners emissions drops off rapidly with distance, and is barely detectable outside of a 5-mile radius of the plant (Southwest Energy Study, 1972). The soils and vegetation in the area of the plant are deficient in most essential elements required by plant life. The report went on to say:

> The increases in elemental contents recorded by the vegetation samples collected in 1961-62 as compared with those collected at the same sample sites in 1971 show enrichment of all elements required by plant life. This enrichment presumably is due to the trace elements in the wind-born effluent from the stacks of the power station. Despite this enrichment, the trace element content of perennial shrubs in the Four Corners area is presently below the average for the U.S., except for strontium which is naturally a little high in the soils and vegetation of San Juan County. The content of potentially harmful trace elements in vegetation in the region surrounding the Four Corners power station is very low compared to the average in the United States.

The report also states that there is a possibility of a build-up in potentially harmful elements and that this possibility should be monitored.

A trace element study performed by Hope College in 1972 around a power plant (650 MW) on the shores of Lake Michigan reported measurable amounts of trace elements build-up (Klein and Russell, 1973). Conversely, a comprehensive study by the Atomic Energy Commission performed for the National Science Foundation around the Allen Steam plant (870 MW) near Memphis, Tennessee found no major impact on trace element concentrations after 14 years of plant operation (AEC, 1974).

There were two significant differences between the Lake Michigan and Allen power plant studies which could account for the differences in results (Harris, et al., 1974). First, the background soil concentrations of the elements of interest were much lower in the Michigan area--almost two orders of magnitude. Second, the Michigan measurements were made on soil samples collected under trees, whereas almost all the Allen soils were collected in open farm land. Additionally, meteorological factors differ in the two locations.

Table 1 shows anticipated impacts from the proposed IPP.

APPENDIX III-5
Visibility Calculations

Following is an analysis performed by Westinghouse treating the major pollutants and their expected effects on visibility (Westinghouse, 1977).

Background

This appendix provides a quantitative estimate of the effect of the IPP plant emission on visibility in the area. In particular, an evaluation of the potential reduction in visibility is made for Capitol Reef and Canyonlands National Parks. The estimates are made for two cases:

> Effects on observer sight path within the parks, looking from one point within a park to another (proposed Class I significant deterioration areas)
>
> Effects on observer sight path when he is situated in the park and looking at an object outside the park (Class II or potential Class III significant deterioration areas).

Ambient concentrations of NO_2, particulate matter, sulfates, and nitrates were considered in the calculations. Equations employed in the calculations assume constant extinction coefficients and homogenous distribution of pollutants in the volume element which includes the sight path. Calculated concentrations of various pollutants are those derived for the air quality assessment, averaged over a 20° compass sector. Twenty four hour average concentrations based upon the average coal characteristics are used in the visibility assessment. All results of visibility calculations are based upon three assumptions:

> At a given distance downwind from the plant, the 24-hour average concentrations is evenly distributed within a 20° compass sector.
>
> Existing background visual range is about 140 km (87 miles).
>
> All pollutant concentrations used in the calculations are ground-level concentrations that generally occur along the observer's line of sight.

The basic equation describing visual range is (Middleton, W.E.K., 1958):

$$V = \frac{3.9}{b} \quad (m)$$

where,

V = visual range (m)

b = extinction coefficients (m^1)

The quantity b is made up of three components:

$$b = b_{abs} + b_{scat} + b_{bg}$$

where,

b_{abs} = Extinction coefficient due to absorption by pollutant gases (m^{1})

b_{scat} = extinction coefficient due to scatter by pollutant particles and aerosols (m^{-1})

b_{bg} = extinction coefficient for clean air (m^{1})

The latter extinction coefficient, b_{bg} is about $2.8 \times 10^{5}\ m^{1}$ (Carlson, et al., 1967).

$$V_{bg} = \frac{3.9}{2.8 \times 10^{-5}} = 140 \text{ km (87 miles)} \qquad (2)$$

Visual range as determined by an observer visibility study for the general area surrounding the site under ideal air conditions (no haze, rain, snowfall, dust, or low level clouds) is about 130 to 145 km (80 to 90 miles). The calculated value of the visual range in clean air (Equation [2]) compares well with the results of the observer visibility study for clean air conditions. Therefore, the use of the extinction coefficient for clean air ($b_{bg} = 2.8 \times 10^{-5}\ m^{-1}$]) in the visibility assessment is a reasonable value which correlates with local observations.

One of the prime objectives of visibility studies is to relate pollutant concentration to the visual range. Results of various studies provide data on the ratio of mass concentration to extinction coefficient, expressed as β $(\mu g/m^{2})$ rather than as b.

Since the coefficient β is more readily available than b, Equation (1) must be modified to include the coefficient β instead of b. If the average 24-hour concentration of a pollutant at a given distance downwind from a source is X $(\mu g/m^{3})$, and the plume width at that distance downwind is Δs and the visual range in clear air is V_{bg}, then distributing the mass concentration X uniformly in a box with a 1 m^{2} cross-section oriented along the sight path of a observer given $\frac{X\Delta s}{V_{bg}}$

Since by definition $\frac{X\Delta s}{V_{bg}} \beta\ abs + \frac{X\Delta s}{V_{bg}} \beta\ scat = b_{abs} + b_{scat}$,

visual range considering pollutants, becomes:

$$V = \frac{3.9}{\sum^{h} \frac{X_{i\Delta s}}{Vbg} \beta_i + b_{bg}} \qquad (3)$$

where,

$\frac{X_{i\Delta s}}{V_{bg}}$ = The concentrations of the i' th pollutant under consideration uniformly distribed along the sight path ($\mu g/m^3$).

X = pollutant concentrations ($\mu g/m^3$)

Δs = plume width along the sight path at the distance downwind where X_i is calcualted (m)

β_i = mass concentration to extinction coefficient ratio for the i' th pollutant under consideration ($\mu g/m^2$)

Values of β used in the calculations are listed in Table 1.

TABLE 1

Values of Mass Concentration to Extinction Coefficient Ratios

Parameter	Value, mg/m^2	Reference
β_{scat} (particulates)	4.5×10^5	Carlson, 1967
β_{scat} (sulfates)	2.0×10^5	Waggoner, 1976
β_{scat} (nitrates)	2.2×10^5	Williams, et al., 1975
β_{abs} (NO_2)	5.26×10^6	Robinson, 1968

Results of Calculations

Estimates of the potential reduction in visibility resulting from the plant operation were made using Equation (3), the β values listed in Table 1 and estimated 24-hour concentration of various pollutants under consideration that were calculated to occur at different locations, expecially in Capitol Reef and Canyonlands National Parks. The rate of conversion of SO_2 into sulfates assumed in the calculations is 1 percent per hour. The rate of converions of NO_2 into nitrates assumed in the calculations is 1 percent per 24 hours.

The findings of the calculations are given in Chapter 3 under visibility.

POPULATION IMPACTS RESULTING FROM COAL MINING IN THE SIX-COUNTY AREA

FEBRUARY 1979

Office Of Community And
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Six - County Commissioners Organization
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EFFECTS OF COAL MINING IN THE SOUTHERN WASATCH PLATEAU

Recently there has been considerable amount of interest and speculation over the potential development of coal leases in the central Utah area. In the fall of 1978, a draft environmental impact statement by the Department of the Interior was submitted for analysis. Unfortunately the statement was out of date before it was published. One of the major assumptions the EIS is based on is the 3,000 megawatt power plant located in the Salt Wash (center) area of Wayne County. Decisions made by the Secretary of the Interior and other situations suggest strongly that this is no longer a possibility. Thus, the assumptions the location of mines and mining activities along with population magnitude and distribution are no longer valid, and the EIS does not represent an accurate description of the proposed or likely coal mining activities, especially in the Southern Wasatch Plateau. Therefore, the population projections for the towns in Sevier, Sanpete and Emery Counties cannot be utilized for planning purposes. In order to provide an accurate picture of possible mining activities, we have chosen to use the raw data supplied by the coal industry for the EIS in the form of the submitted plan production level produced by the proposed lease holders, and use these for our production projections.

Maximum Plan Productions

Utilizing the industries plan, we have calculated the total amount of tonage per year as maximum plan levels were reached. The following table indicates the named mines and their maximum production levels.

1990 PLANNED MAXIMUM PRODUCTION FOR SALINA CANYON

MINE	OWNERS	ANNUAL PLANNED MAXIMUM PRODUCTION
1. SUFCO	Costal State	2.0 Million tons
2. Skutumpah	Energy Reserves Group	2.0 Million tons
3. Rock Canyon	Energy Reserves Group	0.7 Million ton
4. Knight Mine	Energy Reserves Group	0.7 Million ton
5. Hansen Mine	L.B. Hansen	0.3 Million ton
6. M.S.R. #1	Mountain States Resources	0.5 Million ton
7. M.S.R. #2-6	Mountain States Resources	4.5 Million tons
		10.7 Million tons

High Productions

Realizing that it is unlikely that all of the proposed lease holders are producing their maximum production levels, we have contacted the major proponets and analyzed the maximum market potential including Japan. Also we have analyzed the possible limits of transportation linkages in Salina Canyon. The following table indicates the high projection that could occur.

SUFCO	2.0
Skutumpah	2.0
Rock Canyon	0.7
Knight	0.7
Hansen	0.3
M.S.R.	1.0
TOTAL -	6.7 Million ton Annually

Medium Production

Medium production level is based on the assumption that the existing mining activities including those presently under construction reaching a moderate level of production by 1990 and the medium production level is the most likely level of production that could occur.

SUFCO	1.5
Skutumpah	1.0
Rock Canyon	0.4
Knight	0.5
M.S.R.	0.4
TOTAL -	3.8 Million ton Annually

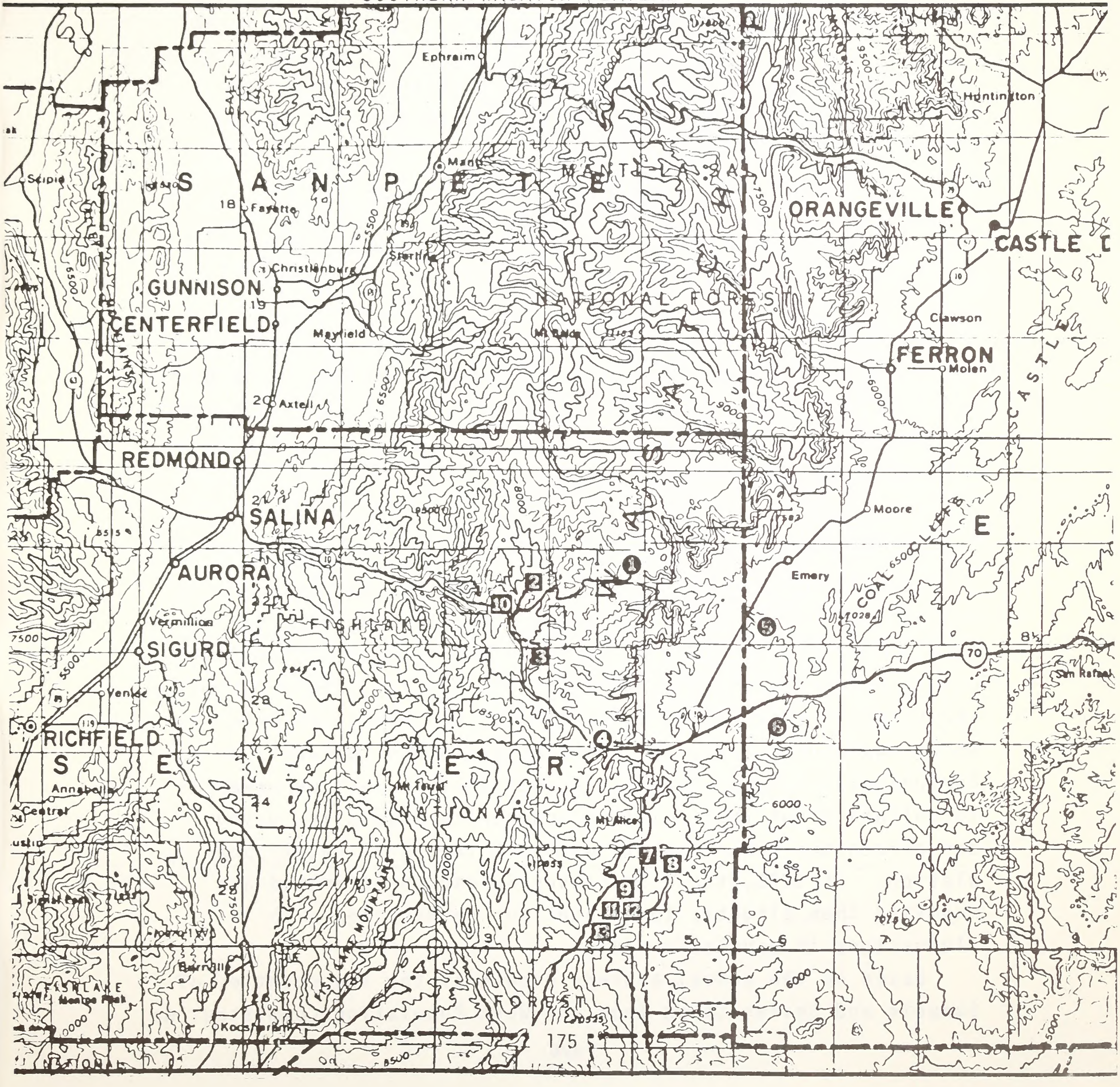
Low Production

Low production level represents the present production level of existing mines and minimum production level increase of the present planned mines or those under construction. The low production market area would be based on low market potential for existing region markets.

SUFCO	1.4
Skutumpah	0.5
Knight	0.4
M.S.R.	0.2

TOTAL- 2.5 Million ton Annually

SOUTHERN WASATCH PLATEAU



POPULATION IMPACTS

The main components in assessing the social and economic impact on a area is the population projections and there distribution patterns. In this report, we will utilize the specific data used in the regional and environmental impact studies relative to the number of tons per miner per year and the new population per million ton generated.

Population Per Million Ton

On page SM-29 of the Site Specific Analysis is a new population impact formula. This is based on the one million tons of coal mined in a year.

Mining employees and their families --------	940
Secondary Business and industry employees and their familes ----------------	836
Total new population ----------------------	1776

This is based on approximately 15 tons per day per miner, which may be a little high, considering the average in Carbon and Emery fields is about 10 tons per day. The service related of business and industrial employees is based 1.3 to 1.4 multiplier ratio.

Existing Community Population

Since the 1970 Census Data is so far out of date and does not accurately display the present trends in the central Utah area, we are choosing the Utah Population Work Committee county estimates between the years of 1970-78. These estimates are based on employment, construction, and education data which has proven to be extremely accurate and current. Unfortunately, they are only on a county basis, and we have to delineate out the individual community population using the percentage the community makes of the total county population. In 1975, the U.S. Census Bureau re-estimated and modified them slightly to account for communities with fluxuations in population gain.

Based on the annual average growth of the two counties of Sanpete and Sevier taken from the Work Population Committee, we

then projected this eighth year average to continue until 1985. The average annual increase for Sanpete has been 2.88 per year. Sevier's annual increase has been 3.68 per year.

In 1990, we cut the growth rate by 25% from past trends in Sevier, and 20% in Sanpete County because of demographic characteristics of the two counties and the overall leveling out of population resulting from the baby boom that will stabilize between 1985 and 1990.

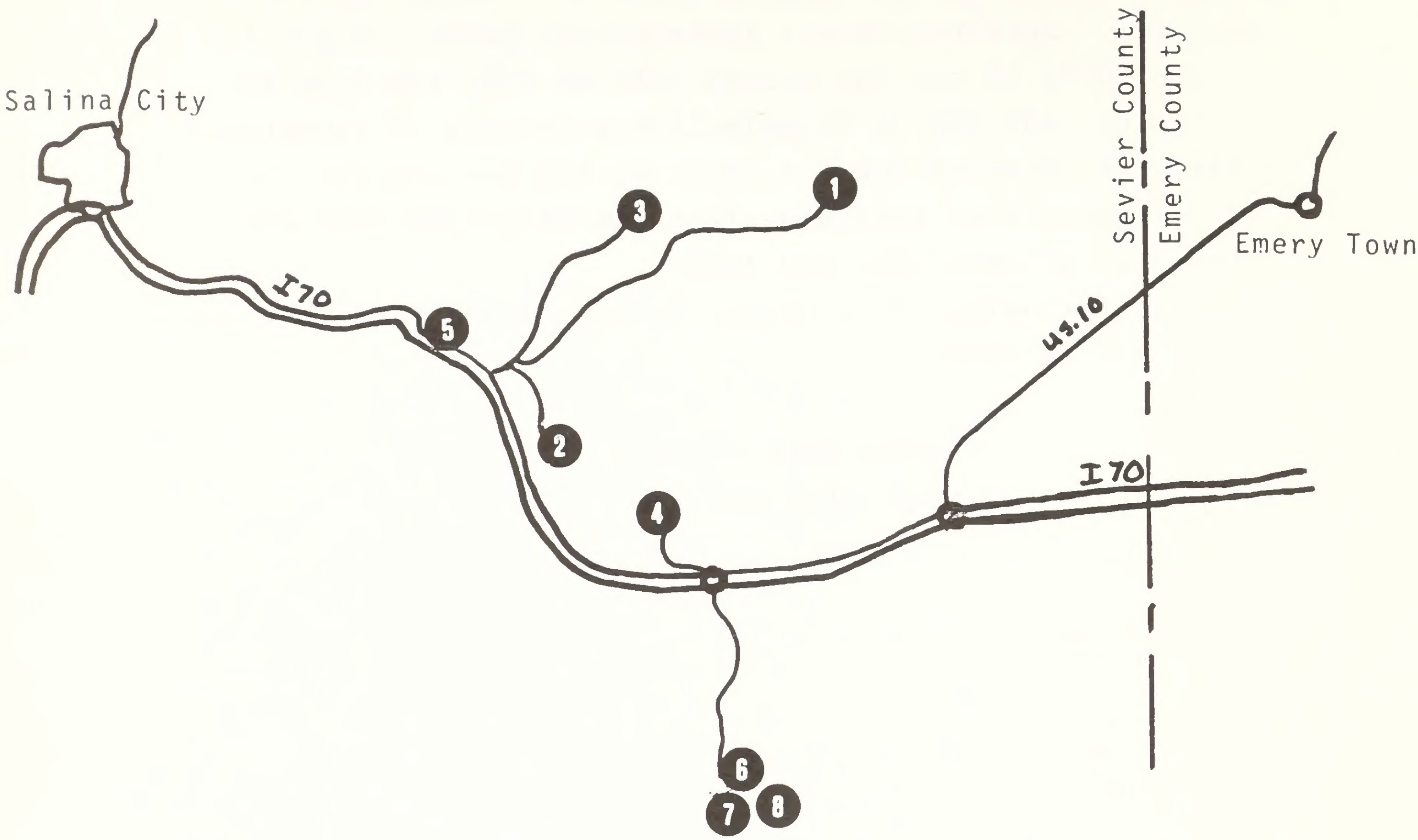
The following chart shows the base line growth projected from 1978 to 1990.

BASE POPULATION GROWTH
WITHOUT INCREASED COAL MINING

	1978	1980	1985	1990
Sevier				
Aurora	803	862	1020	1160
Redmond	561	602	712	810
Richfield	6055	6500	7696	8758
Salina	2062	2213	2620	2981
Sigurd	437	469	555	631
South Sanpete				
Centerfield	576	608	695	774
Gunnison	1417	1497	1712	1908
North Sanpete				
Mt. Pleasant	2072	2190	2505	2793
Spring City	702	742	848	945
Fairview	950	1004	1148	1280

APPENDIX III-6 (continued)

POPULATION DISTRIBUTION



Where the new miners and their families will live (or population distribution) is the key part of assessing the impact on community growth resulting from new population.

The following percentages are based on the number of new residents in Sevier and Sanpete Counties. The basis for this is the attraction level or percentage that towns can support growth and closeness based on transportation systems to the main impact mining area.

		Sevier	Sanpete
1.	SUFCO	90%	5%
2.	Rock Canyon	90	5
3.	Skutumpah	90	5
4.	Knight	68	2
5.	Hansen	90	5
6.	Mountain State's	58	2
7.	Resource #1	59	1
8.	M.S.R. #'s 2-6	59	1

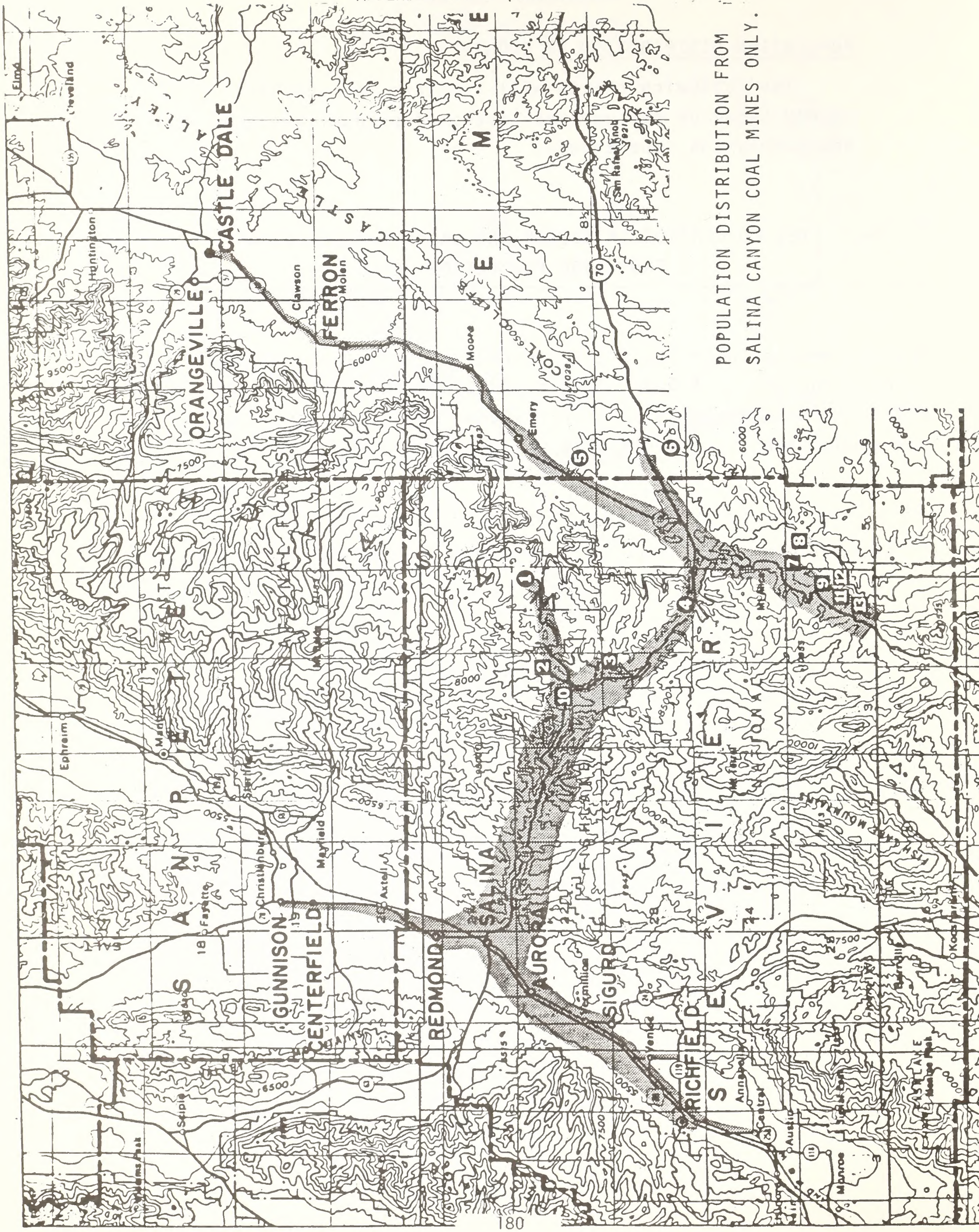
POPULATION DISTRIBUTION BY COUNTY

The following charts will indicate the population by county based on the various levels of productions and their new population impact only.

NEW POPULATION IN SEVIER AND SANPETE COUNTIES FROM 1990 PRODUCTION LEVELS

			Sevier	Sanpete
Maximum production	+ 9.2 x 1776 =	16339 new population	13888	555
High production	+ 5.2 x 1776 =	9235 new population	7849	313
Medium production	+ 2.3 x 1776 =	4084 new population	3471	131
Low production	+ 1.0 x 1776 =	1776 new population	1509	60

* The remaining population will reside in Carbon and Emery Counties.



POPULATION DISTRIBUTION FROM SALINA CANYON COAL MINES ONLY.

ADDITIONAL POPULATION FROM COAL MINE PRODUCTIONS BY COUNTIES

The following population projections will be based on various levels of productions; maxium, medium, high, and low, using the 1776 new residents per million ton mined annually and assuming that 1.5 million tons represent the existing productions for the Salina Canyon area. Here is the break out by community in Sevier and Sannete counties.

ADDITIONAL NEW POPULATION - MAXIMUM PRODUCTION LEVEL

	1985	1990	1985	1990
ADDED NEW RESIDENTS			TOTAL POPULATION	
Aurora	1812	2083	2832	3243
Redmond	1087	1087	1799	1897
Richfield	2295	2638	9991	11,396
Salina	4832	5555	7452	8536
Sigurd	604	694	1159	1325
Other Co.	1449	1666	-	-
Centerfield	178	205	873	979
Gunnison	265	305	1977	2213
Other Co.	38	444	-	-

ADDITIONAL NEW POPULATION - HIGH PRODUCTION LEVEL

	1985	1990	1985	1990
	ADDED NEW RESIDENTS		TOTAL POPULATION	
Aurora	1024	1177	2044	2337
Redmond	614	706	1326	1516
Richfield	1297	1491	8993	10,249
Salina	2731	3139	5351	6120
Sigurd	341	392	896	1023
Other Co.	819	941	—	—
Centerfield	101	116	796	890
Gunnison	150	172	1862	2080
Other Co.	21	25		

ADDITIONAL NEW POPULATION - MEDIUM PRODUCTION LEVEL

	1985	1990	1985	1990
	ADDED NEW RESIDENTS		TOTAL POPULATION	
Aurora	452	520	1472	1680
Redmond	271	312	983	1122
Richfield	573	659	8269	9417
Salina	1207	1388	3827	4369
Sigurd	150	173	805	804
Other Co.	362	416	–	–
Centerfield	44	51	739	825
Gunnison	66	76	1778	1984
Other Co.	10	11		

ADDITIONAL NEW POPULATION - LOW PRODUCTION LEVEL

	ADDED NEW RESIDENTS 1985	1990	TOTAL POPULATION 1985	1990
Aurora	196	226	1216	1386
Redmond	118	136	830	946
Richfield	249	286	7945	9044
Salina	524	603	3144	3584
Sigurd	65	75	620	706
Other Co.	157	182		
Centerfield	19	22	714	796
Gunnison	28	33	1740	1941
Other Co.	5	6		

1990

TOTAL POPULATION BY PRODUCTION LEVELS

SEVIER	Low Production	Medium Production	High Production	Maximum Production
Aurora	1386	1680	2337	3243
Redmond	946	1122	1516	1897
Richfield	9044	9417	10,249	11,396
Salina	3584	4369	6120	8536
Sigurd	706	804	1023	1325

SANPETE				
Centerfield	796	825	890	979
Gunnison	1941	1984	2080	2213

IMPACTS ON INFRASTRUCTURE RESULTING FROM IPP AT SALT WASH

There are two alternatives that could be used to facilitate the population growth resulting from IPP. One is a new town located in the Cainesville-Blue Valley area. The estimated cost of the new town was forty-five million dollars. This includes roads, water and sewer, schools, parks and other essential services. The community would be designed for a maximum eight thousand residents and would be designed to occupy three-thousand to forty-five hundred permanent residents, after the construction phase is completed.

The new town would absorb approximately 80% total population resulting from IPP. The other 20% would be distributed among the existing communities in Wayne County with the majority of it being in the Hanksville area.

If the new town is used, most of the communities have adequate acreage to support the additional residential increase including the construction phase. All of the communities have adequate water systems to handle new growth. Hanksville, even though they have a new water system, could probably not accommodate the projected population that they would receive. Possible problems will arise during the construction phase with the increased numbers of mobile homes, that would come for temporary construction workers.

Presently, ordinances and codes in the towns and county do not prohibit the location of mobile homes nor do they segregate or locate them in mobile home parks. Thus the new population, being predominantly mobile homes, will require the same level of services as conventional homes, but do not pay the same amount of property tax because of the lower accessed value of mobile homes in relation to conventional homes.

Road Systems

The predominant road system from the proposed plant site and the existing communities is Highway 24. This is a two-lane highway with limited traffic volume increase potential because of having to pass through Capitol Reef National Park.

APPENDIX III-6 (continued)

IPP - LYNNDYL SITE COAL IMPACTS

IPP is a 3,000 megawatt coal-fired power plant located 11 miles north of Delta. It would require 8 to 9 million tons of coal annually. This is approximately equal to the present total production of coal in the state of Utah. In the original Draft Coal Environmental Impact Statement for central Utah, the Salt Wash site in Wayne County was the proposed site, meaning that coal mines in the leasing areas of the Southern Wasatch Plateau would be the main source of coal for the Salt Wash proposal. If IPP moves to the Lynndyl site north of Delta, the likelihood of the Southern Wasatch Plateau coal being the sole source is slight. Most of the coal, rather, would come from the Carbon/Emery area. The EIS's planned production level of coal mining is 24 million tons annually for the state of Utah. We believe this to be about 5 million tons short of what will be needed to handle existing demands, normal expansion and the proposed IPP plant at Lynndyl.

Although most of the coal for IPP will come from Carbon and Emery Counties, some of the impact will be felt in Sanpete and Sevier and the six county area in general.

Proposed lease holders in the Scofield-Echoes Canyon area of Northern Wasatch Plateau have established plans for the development of a considerable amount of coal in that area. Some estimates are anywhere from 6 to 8 million tons per year. This would mean approximatley 12 to 18 hundred new mining and mining related jobs in the area, which would result in a population increase from 5 to 7 thousand. Since the northern part of Sanpete county is closest both through location and transportation linkages to the Scofield coal field areas, it is anticipated that they will receive a considerable impact in new population, especially in the towns of Mt. Pleasant, Fairview, and Spring City. It is estimated as many as 500 to 700 new miners may relocate to this area. Presently there is only a dirt road linking Scofield-Echoes Canyon to the U-31 and northern Sanpete County. But with the improvement of this road and connecting it up with U-31, this would make it accessible to these northern Sanpete towns.

Also there are some proposals in the Huntington Canyon areas for three other mines with the possibility of 2 to 3 million tons per year production from that area. Again the

linkage of U-31 through the canyon down into the Fairview, Mt. Pleasant area makes this an accessible place for people to live.

The ability of communities in the northern Sanpete County to handle the coal impact is limited only by some inadequates in their water systems. Also Sanpete County has no zoning ordinances and restrictions on the placement of homes. There is also a considerable amount of available recreation mountain home sites in this area that were originally designed exclusively for summer use, but possibly could be used for year round housing. This would cause a extreme economic burden both on school, fire, police, and all services of the county to these areas. Many of the small communities in Sanpete County have limited ordinances and planning capability. There also may be be problems with mobile homes scattered throughout the communities and the effect this has on the tax base of small rural areas.

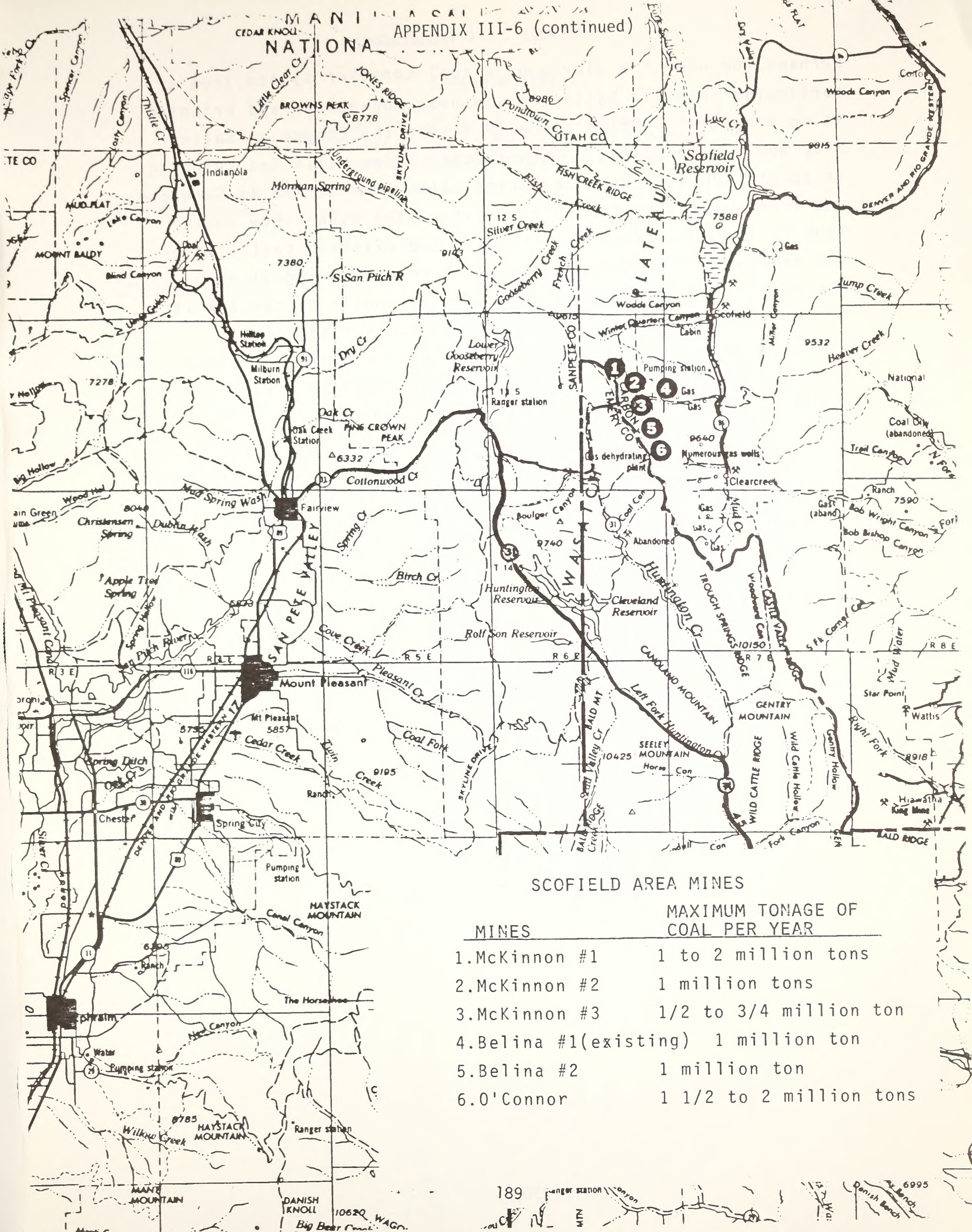
Positive Impacts

This area has been an economically depressed area with high unemployment rate and seasonal unemployment rate flux-uations, because of the agricultural economy of this area. These year round well paying jobs will add an important factor in the economic sector of this area.

Even though a large part of the coal mining in the Southern Wasatch Plateau area would be no longer accessible to the IPP proposed Lynndyl site, it would be very likely that the existing mines on the eastern half of the Southern Wasatch Plateau, predominantly the SUFCO, Rock Canyon, etc. could possibly ship the coal by truck down Salina Canyon and up Scipio Vally and across into the IPP site. However, the road would have to be upgraded to handle the heavier traffic volume.

A preferred alternative to this would be the construction of a proposed railroad, which connects Salina Canyon and the IPP plant site. This would make coal very accessible to IPP and also the main Union Pacific rail line running to California, which would serve the main western market for coal.

The number one problem in Salina Canyon is getting the coal out of the higher elevations. I-70 is somewhat limited. The maximum amount of volume of I-70 is 3 to 4 million tons per year, any more would literally clog the canyon for any other traffic.



SCOFIELD AREA MINES

MINES	MAXIMUM TONAGE OF COAL PER YEAR
1. McKinnon #1	1 to 2 million tons
2. McKinnon #2	1 million tons
3. McKinnon #3	1/2 to 3/4 million ton
4. Belina #1(existing)	1 million ton
5. Belina #2	1 million ton
6. O'Connor	1 1/2 to 2 million tons

Perhaps the use of a slurry or a coal conveyor system from a particular point in Salina Canyon near Gooseberry and bringing it to a central dumping place in either the canyon or Salina City would be possible. Then loading it on rails and shipping it to the IPP site using existing rails from Salina to Gunnison and then connecting the Union Pacific line with a new route from Mills to Gunnison or extending the existing rail line on the old route from Moroni to Nephi then connecting it with the existing Union Pacific line and running it to the IPP site.

A final alternative would effect both Northern and Southern Wasatch Plateau coal fields. This would include a new railroad connecting the existing railroad in Carbon County and running it south to the Ferron-Emery area. This alternative would make it possible to utilize coal both from the Northern Wasatch Plateau and the extreme Southern Wasatch Plateau.

APPENDIX VIII-1

Comparison of Threatened or Endangered Plant Species Along Alternate and Proposed Power Transmission System Routes

Alternative Route	Proposed Route
Geyser Peak	
Astragalus loanus (PE)	None
Dog Valley-Fremont Canyon	
None	None
West Corridor	
Astragalus loanus (PE)	*Astragalus loanus* (PE)
Echinocereus englemannii var. *purpureus* (PE)	*Echinocereus englemannii* var. *purpureus* (PE)
Arctomecon merriamii (PE)	*Astragalus nyensis* (PE)
Mentzelia leucophylla (PE)	*Arctomecon humilis* (PE)
Phacelia cephalotes (C)	*Psoralea epipsila* (PE)
Castilleja salsuginosa (C)	*Mentzelia leucophylla* (PE)
	Arctomecon merriamii (PE)
	Astragalus convallarius var. *lonchocalyx* (C)
	Lupinus jonesii (C)
	Eriogonum thompsonii var. *thompsonii* (C)
	Phacelia cephalotes (C)
	Astragalus geyeri var. *triquetris* (C)
	Eriogonum heermannii var. *subracemosum* (C)
	Penstemon bicolor ssp. *roseus* (C)
	Castilleja salsuginosa (C)
Lake Valley	
Astragalus lentiginosus var. *latus* (C)	*Astragalus lentiginosus* var. *latus* (C)

APPENDIX VIII-1 (concluded)

Alternative Route	Proposed Route
Route 66	
None	Penstemon bicolor ssp. bicolor (C)
	Forsellesia pungens (PE)
	Oryzopsis micrantha (PE)
	Muhlenbergia arsenei (C)
	Enneapogon desvauxii (C)
	Stipa arida (C)
	Tridens pilosus (C)
	Astragalus cimae var. cimae (C)
	Eriophyllum mohavense (PE)
Interstate 15	
Penstemon bicolor (C) ssp. bicolor	Penstemon bicolor (C) ssp. bicolor
Forsellesia pungens (PE)	Forsellesia pungens (PE)
Festuca arizonica (C)	Festuca arizonica (C)
Oryzopsis micrantha (C)	Oryzopsis micrantha (C)
Muhlenbergia arsenei (C)	Muhlenberia arsenei (C)
Enneapogon desvauxii (C)	Enneapogon desvauxii (C)
Stipa arida (C)	Stipa arida (C)
Tridens pilosus (C)	Tridens pilosus (C)
Astragalus cimae var. cimae (C)	Astragalus cimae var. cimae (C)
Linanthus arenicola (C)	Linanthus arenicola (C)
Androstephium brevifolium (C)	Androstephium brevifolium (C)
Northern Corridor	
Penstemon bicolor ssp. bicolor (C)	Penstemon bicolor ssp. bicolor (C)
Forsellesia pungens (PE)	Forsellesia pungens (PE)
Oryzopsis micrantha (C)	Oryzopsis micrantha (C)
Muhlenbergia arsenei (C)	Muhlenbergia arsenei (C)
Enneapogon desvauxii (C)	Enneapogon desvauxii (C)
Stipa arida (C)	Stipa arida (C)
Tridens pilosus (C)	Tridens pilosus (C)
Eriophyllum mohavense (PE)	Eriophyllum mohavense (PE)

C = Candidate - being reviewed for threatened or endangered status.
PE = Proposed endangered - Federal Register, June 16, 1976.

APPENDIX VIII.1-1

Alternative Sites Studied By Governor's Interagency Task Force on Power Plant Siting in Utah

DESERT - HANKSVILLE ALTERNATIVE SITES

The Desert and Hanksville Sites are within 5 miles of each other and are considered together. They are located 5 to 10 miles north-northeast of Hanksville, Utah on the gentle slopes of the southern San Rafael Desert.

Ambient air quality is similar to measurements made near the Salt Wash site, except that the particulate concentrations are probably comparable to the maximum concentrations in Castle Valley--a 24-hour average of 179 μ/m^3 (H. E. Cramer Co. 1978).

Annual precipitation is about 6-8 inches. Temperatures are hot (90°F.) in summer and cold (10°F) in winter months. Soils are sandy and unstable dunes are common. Vegetation is a mixed desert shrub with Mormon tea, sand sage, and galleta grass among the common plants. Two uncommon plant species are likely to occur in this general area: Eriogonum smithii and Astragulus pardalimus.

Peregrine falcons, an endangered species, have been sighted on the flat top mesas, about 12 miles northeast of the sites. Pronghorn antelope graze the general area. Livestock seasonally graze the semi-desert rangeland.

Little recreational use is being made of the areas.

Hanksville, Utah, population 200 is the nearest town to the sites.

The magnitude of maximum ground-level concentrations calculated for the Desert and Hanksville alternative sites are shown below (Bowers, et.al., 1978):

Pollutants	Concentration ($\mu g/m^3$) Averaging Time 3 Hours	24 Hours	Annual
Plant at Desert Site			
SO_2	148	58	1.58
Particulates	--	8	0.23
NO_2	--	--	11.38
Plant Hanksville site			
SO_2	200	68	1.80
Particulates	--	9	0.26
NO_2	--	--	12.95

Both the Desert and Hanksville sites would require a variance to meet 2-hour Federal Air Quality Standards in Capitol Reef National Park, a Class I airshed.

Environmental impacts associated with water uses would essentially be the same as Salt Wash site. Two new 48-inch pipelines from the Caineville areas (Salt Wash) area would be required to convey water eastward to Desert-Hanksville alternative sites.

Major recreational attractions (Lake Powell, Henry Mountains, Fishlake Forest, Canyonlands, San Rafael Swell, Robber's Roost, Green River and Capitol Reef) would receive substantial increases in visitor use because of the rapid influx of people attracted to the region.

Buildings stacks, and aircraft warning lights would be visible from many points throughout the region, including Utah Highway 24 leading from Hanksville to Green River, Utah.

A new community would be required to provide basic needs for construction and operational work forces and their families, also for the secondary work force attracted to the area.

GREEN RIVER ALTERNATIVE SITE

This site is about 15 miles south-southwest from Green River, Utah and eight miles east of the San Rafael Swell.

The concentrations of pollutants, as shown in the following table, are likely to be representative of existing air quality at this site:

	Maximum Concentrations[a] ($\mu g/m^3$)			
Pollutant	1-Hour	3-Hour	24-Hour	All Samples
Sulfur Dioxide (SO_2)	<13	<13	<13	<13
Nitrogen Dioxide (NO_2)	40	--	--	13
Ozone (O_3)	132	--	--	59
Suspended Particulates	--	--	179[b]	--

[a]Source: Environmental Systems Department of Westinghouse Electric Corporation.

[b]Source: Bower, et. al., 1978.

Mean annual precipitation is near 8 inches. Temperatures are high in summer (90°F) and cold in winter (10°F). Soil types are clay-silts to sandy with bedrock common. Vegetation is dominated by salt desert shrubs, including shadscale, rabbit brush, sand dropseed, and galleta grasses. Astragulus pardelinus, an uncommon plant species has been identified nearby on Horsebench (Dames and Moore, November, 1977).

The Utah Division of Wildlife Resources reports that the Colorado River squawfish and humpback chub, both endangered species, are found in the Green River from the vicinity of Ouray to Green River, Utah. Also found are the bonytail chub, proposed endangered species and razorback sucker, a proposed threatened species.

Domestic livestock graze this area 10 months each year. Active exploration for uranium is being conducted on adjacent areas. Little recreational use is made in this general area, although it forms a portion of a panoramic view as seen from the Spotted Wolf Overlook near Interstate Highway 70.

Green River, Utah, the nearest town, has a population of 1,050. Commercial enterprises depend largely on travelers along Interstate Highway 70 which passes through the area.

Anticipated Environmental Impacts

The H. E. Cramer Company (Bowers, et.al., 1978) reported that the following maximum ground level concentrations could occur at the Green River site:

Pollutants	Maximum Concentrations (µ/m³) 3 Hour	24 Hour	Annual
SO_2	118	48	1.44
Particulate	--	7	0.21
NO_2	--	--	10.40

Compliance with short-term Class I PSD requirements at existing Class I areas, Capitol Reef National Park, Canyonlands, and Arches National Park is projected. Potential Class I areas (Desolation Canyon, lower Green River, and Mexican Mountain) would require a variance. Projected ground level concentrations of sulfur dioxide on the San Rafael Swell, even with 5 percent variance, would exceed Class I limitations.

If the Green River were the source of water to operate a plant at this source, impacts on the four threatened or endangered fish species might occur. Additional studies would be needed before preliminary projections can be confirmed.

Commuting time to communities of sufficient size to provide housing and other basic needs for workers and families is excessive (50-60 miles), and a new town would be required.

BECKWITH ALTERNATIVE SITE

Site is about 6 miles west of Green River, Utah, north of Highway 50 and about 3 miles south of the Beckwith Plateau.

Investigations by H. E. Cramer Co. (Bowers, et. al, 1978) indicated that ambient air quality data was incomplete. They reasoned, however, that the high short-term particulate concentrations that tend to occur in rural Utah are also likely in this region of Utah. Local particulates are mostly wind blown dust associated with semi-desert soils and farming activities.

Mean annual precipitation is about 8 inches. Temperatures range from hot (90°F) to cold (10°F) during seasonal flucuations. Mancos shales are parent materials for highly erodible soils. Vegetation is sparse and principally shaltbush and galleta grass.

The black-footed ferret, a threatened species, has been sighted on adjacent areas. The Utah Division of Wildlife Resources indicates the site is suitable habitat. The Colorado River squawfish, humpback chub, both endangered species, are found in the Green River from the vicinity of Ouray to Green River, Utah. Also indigenous to this stretch of the river are the bony tail chub, a proposed endangered species, and razor back sucker, a proposed threatened species.

Livestock graze the general area, however forage production is low. Little recreational use is made of this badland area. Numbers of off-road vehicle are increasing in this area, however.

Motorists traveling nearby U. S. Highways 50-6 and Interstate 70 have a panoramic view of the towering Beckwith Plateau and the surrounding badlands. The site is located on these badlands.

Anticipated Environmental Impacts

Investigations (Bowers, et. al., 1978) estimated that stack emissions could result in the following maximum ground level concentrations:

	Concentrations (μ/m^3) Averaging Time		
Pollutants	3 Hour	24 Hour	Annual
SO_2	320	38	1.02
Particulates	--	5.0	0.15
NO_2	--	--	7.32

Compliance with existing Class I air quality standards could be expected. Potential Class I areas, (i.e., Desolaton Canyon, San Rafael Reef, and Sids Mountain) would, however, require a maximum of a 5 percent variance.

Impacts cannot be predicted on the black-footed ferret, its habitat, or upon the four threatened or endangered fish species until additional investigations are conducted.

Increased recreational use would be expected from workers and their families on the attractions located within a two-hour driving distance of their residences. This would place stress on developed recreation sites, wildlife populations, including fish and other game species.

About 60 animal unit months of sheep forage could be lost if the power generating station were constructed on this site.

Towns within reasonable commuting distance, are not large enough to support workers and their families and a new town would be required.

MOUNDS ALTERNATIVE SITE

The Mounds site is 10 miles southeast of Wellington, Utah.

Wind blown dust is characteristic of the nearby Castle Valley, but has not been measured at this site.

Mean annual precipitation is about 8 inches. Temperatures are not extreme and range between summer highs of 85°F and winter lows of 20°F.

Soils are generally saline and support salt desert shrubs, galleta, and blue grama grasses. No threatened and endangered plant species have been observed.

The peregrine falcon, an endangered species, has been sighted at Mounds within recent years. Pronghorn antelope make use of surrounding hills and benches. Livestock graze this rangeland.

Little recreational use, except antelope hunting, is made of the site.

Carbon-Emery counties have experienced rapid growth in small towns during the past decade due to expansion of coal production and the construction and operation of several electric power generating plants.

Anticipated Environmental Impacts

Calculations (Utah Bureau of Air Quality, 1977) show that stack emissions could result in the following maximum ground level concentrations:

Pollutants	Concentrations ($\mu g/m^3$)		
	3 Hour	24 Hour	Annual
SO_2	99.1	39.7	8.9
Particulate[a]	--	--	--
NO_2[a]	--	--	--

Note: Lack of meteorological date for closed projections by H. E. Cramer Co.

[a]Not considered by State of Utah in "screening" studies.

The "screening" studies conducted by the State of Utah Bureau of Air Quality indicated that National Ambient Air Quality Standards and non-deterioration increments could be met at this site, however detailed investigations were not undertaken because meteorological data are lacking.

Although the peregrine falcon has been sighted in the Mounds area, it has not been determined if the site provides habitat for this endangered species. The Mounds area is important for antelope fawning between May 15 and July 1 of each year.

Stress on housing and community infastructure could increase within Carbon-Emery counties if a plant were constructed on this site.

APPENDIX VIII-1-2

Land Status of Right-of-Way in the Transmission System

Segment	Length in Miles	Number and Size of Lines in Seg.[a]	Towers Per Mile	Assumed Length of Stub Roads	Disturbed by Stub Roads Mi	Disturbed by Stub Roads Ac	Disturbed by New Access Mi	Disturbed by New Access Ac	Disturbed by Stub and Access Mi	Disturbed by Stub and Access Ac	Tower Pads Disturbed	Total Disturbed Ac	Total Disturbed Ac/Per.	Permanent New Access/Occupied Mi	Permanent New Access/Occupied Ac	Tower Pads Occupied	Total Occupied Acres	Total Occupied Acres/mile
SOUTHERN CALIFORNIA TRANSMISSION SYSTEM SEGMENTS INDEPENDENT OF THE SALT WASH SYSTEM																		
Lynndyl to Little	24	1-500	4.01	155	2.8	4.75	14	24	22	37	86.62	141	5.9	0	0	3.85	7	.2916
Drum Junction		1-230	7.06	155	4.97	8.43					16.94					3.38		
Little Drum to	131	1-500	4.01	67	6.7	11.4	112	190	121	205	472.78	757	4.95	11	19	21.01	44	.2876
Highland	22	1-500	14.12	150	2.5	4.2					79.4					3.53		
Lynndyl to U.P.	8	1-500	4.01	250	1.5	2.5	0	0	7	11	28.87	51	6.4	0	0	1.28	4	.5000
Junction		2-345	14.12	250	5.3	8.9					11.30					3.38		
U.P. Junction to	210	1-500	4.01	67	10.7	18.2	131	222	142	240	757.89	998	4.75	13	22	33.68	56	.2666
Subtotal	395				34.47	58.38	257	436	292	493	1453.8	1947	4.93	24	41	70.11	111	.2800
SOUTHERN CALIFORNIA SYSTEM SEGMENTS COMMON TO THE LYNNDYL AND SALT WASH SYTEMS																		
Highland Junction	123	1-500	4.01	66	6.17	10.47	55	93	61	104	443.9	547.9	4.454	6	10	19.72	29.72	.2416
to Gypsum Junction	62	1-500	4.01	110	5.18	8.79	0	0	5	9	223.76	223	3.75	0	0	9.94	9.94	.1603
Toquop to Gypsum Junction	38	2-500	8.02	230	13.20	22.52	0	0	13	23	274.42	297	7.827	0	9	12.20	12.20	.3211
Gypsum Junction to Eldorado Junction																		
Eldorado Junction	28.3	1-500	4.01	66	1.42	2.41	27	46	46	78	102.19	685	4.075	3	5	4.54	31.96	.1902
to Victorville Line I	139.7		4.01	125	17.51	29.72					504.43					22.42		
Eldorado Junction to Victorville, Line II	178	1-500	4.01	165	22.32	37.87	49	83	71	121	642.72	764	4.291	5	8	28.57	36.57	.2054
Subtotal	569				65.88	111.78	131	222	196	335	2191.42	2527	4.44	14	23	97.39	120.39	.2116
UTAH TRANSMISSION SYSTEM SEGMENTS INDEPENDENT OF THE SOUTHERN CALIFORNIA SYSTEM																		
U.P. Junction to Mona	42	2-345	14.12	50	16.8	28.5	32	54	49	83	59.30	142	3.4	3	5	17.79	23	.5476
Little Drum to	20	1-230	7.06	37	.98	1.7	20	34	35	60	14.12	145	1.21	2	3	2.82	20	.1666
Gonder	100	1-230	7.06	105	14.0	23.8					70.6					14.12		
Sigurd to Paragonah	92	1-230	7.06	105	12.9	21.9	0	0	13	22	64.95	87	95	0	0	12.99		
Paragonah to	23	1-230	7.06	155	4.7	7.9	38	65	48	82	16.24	136	1.77	4	7	3.25	18	.1016
St. George	23	1-230	7.06	37	1.1	1.1					16.24					3.25		
	31	1-230	7.06	105	4.4	7.5					21.89					4.38		
Subtotal	331				54.88	93.2	90	153	145	247	263.34	510	1.54	9	15	58.6	61	.1843
Total	1295				155.23	263.36	478	811	633	1075	3908.56	4984	3.85	47	79	171.88	292.39	.2258

[a]The 500-kV lines are the Southern California Transmission System; 230-kV and 345-kV are the Utah Transmission System.

[b]Assumes that stub road length would be 33 to 50 percent of the total width of rights-of-way including other transmission lines when IPP 500-kV lines would share common corridor with existing transmission lines.

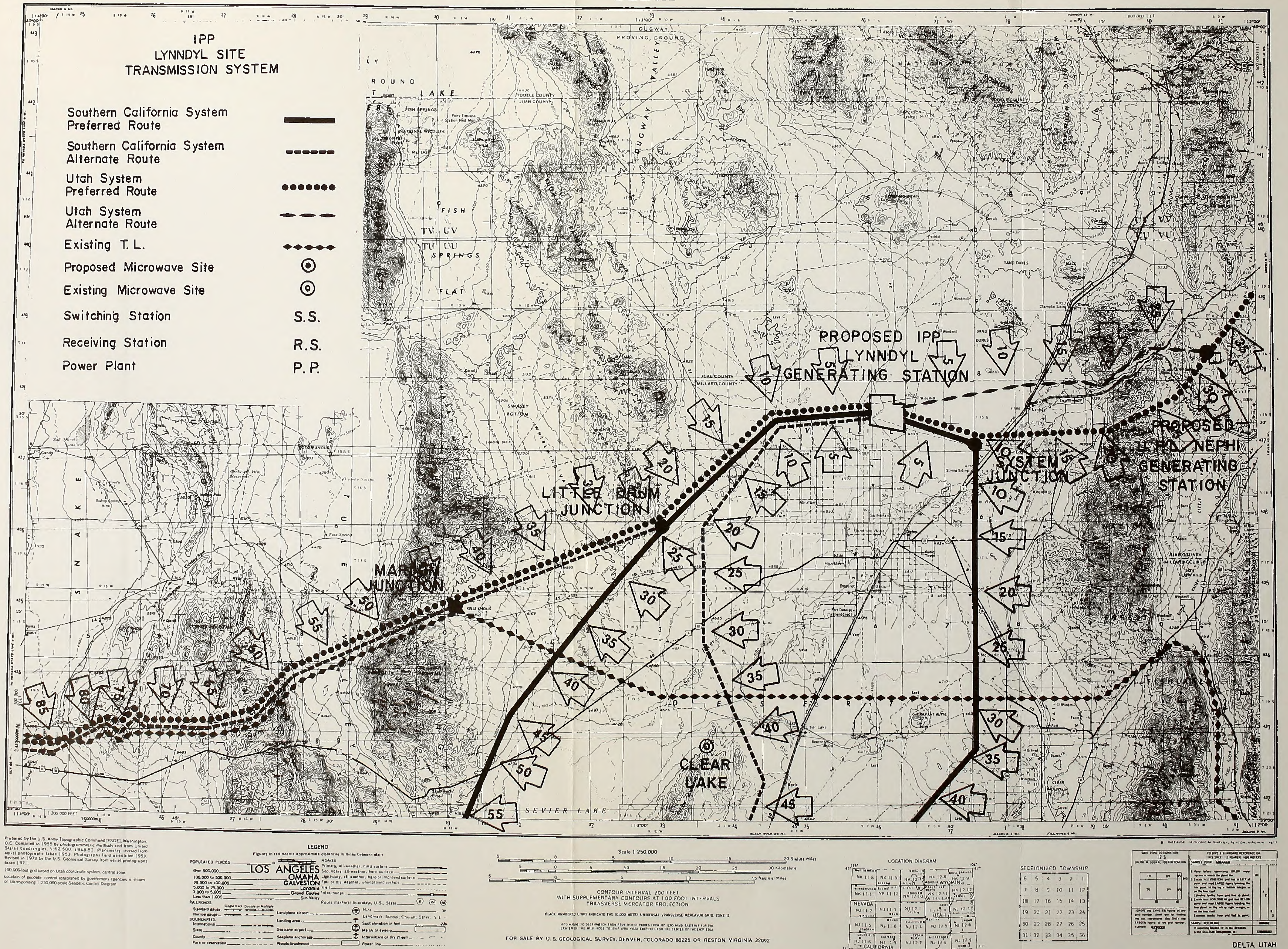
[c]Width of access and stub roads is 14 feet.

[d]500-kV towers disturb 0.9 acre. 230-kV and 345-kV towers disturb 0.1 acre.

[e]Ten percent of new access is assumed permanent.

[f]500-kV towers occupy 0.04 acre. 345-kV towers occupy 0.03 acre. 230-kV towers occupy 0.02 acre.

DELTA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TRANSMISSION SYSTEM
Southern California System Preferred Route
Southern California System Alternate Route
Utah System Preferred Route
Utah System Alternate Route
Existing T. L.
Proposed Microwave Site
Existing Microwave Site
Switching Station S.S.
Receiving Station R.S.
Power Plant P.P.
PROPOSED IPP LYNNDYL GENERATING STATION
PROPOSED IPP NEPHI GENERATING STATION
SYSTEM JUNCTION
LITTLE DRUM JUNCTION
MARION JUNCTION
CLEAR LAKE
SEVIER LAKE
DUGWAY PROVING GROUND
ROUND LAKE
FISH SPRINGS FLAT
SEVIER
DESERT
CONTOUR INTERVAL 200 FEET
WITH SUPPLEMENTARY CONTOURS AT 100 FOOT INTERVALS
TRANSVERSE MERCATOR PROJECTION
FOR SALE BY U.S. GEOLOGICAL SURVEY, DENVER, COLORADO 80225, OR RESTON, VIRGINIA 22092
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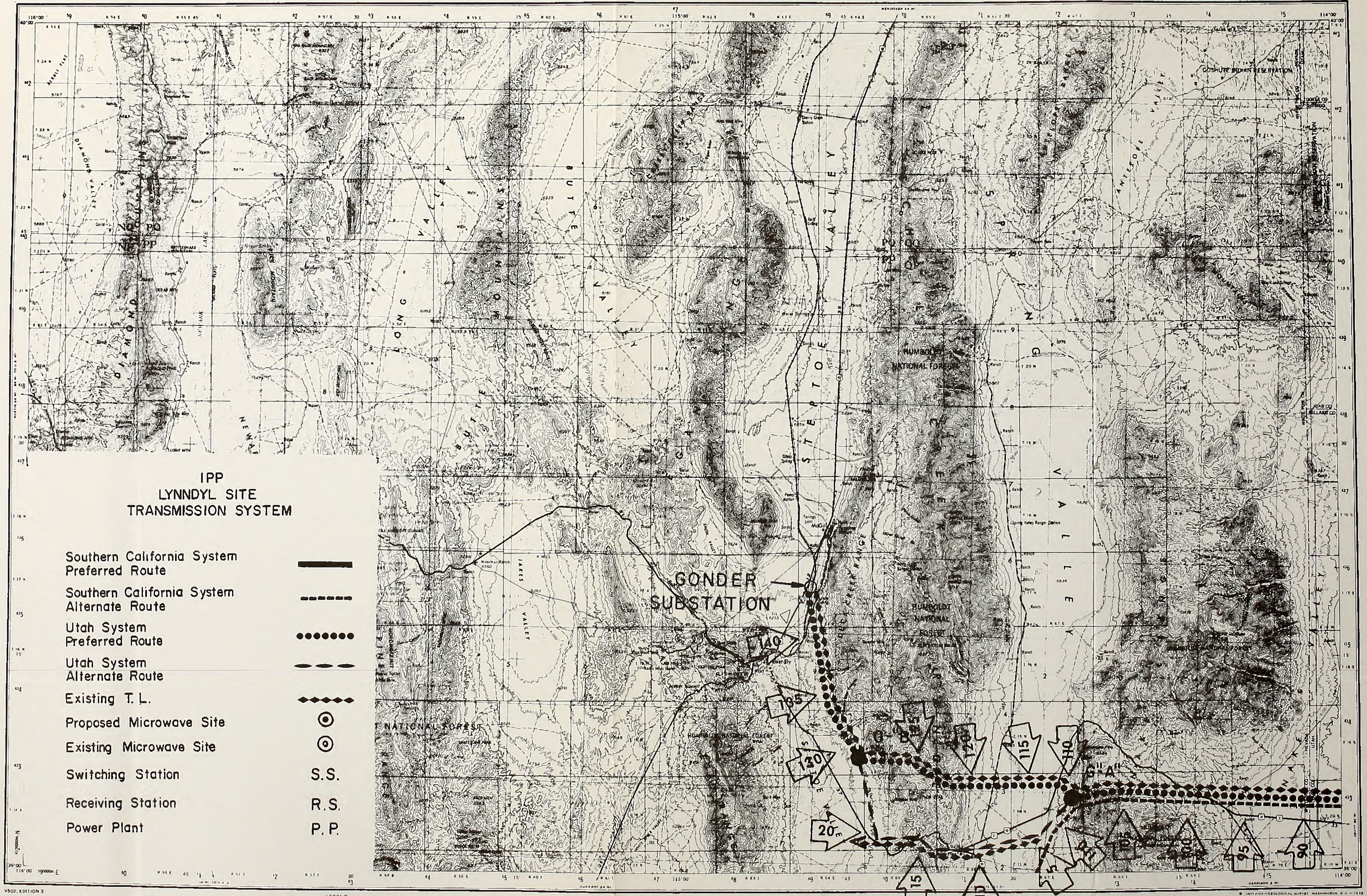
LEGEND
DELTA, UTAH
1953
REVISED 1972



CONTOUR INTERVAL 200 FEET
WITH SUPPLEMENTARY CONTOURS AT 100 FOOT INTERVALS
TRANSVERSE MERCATOR PROJECTION

FOR SALE BY U.S. GEOLOGICAL SURVEY, DENVER, COLORADO 80225, OR WASHINGTON, D.C. 20244

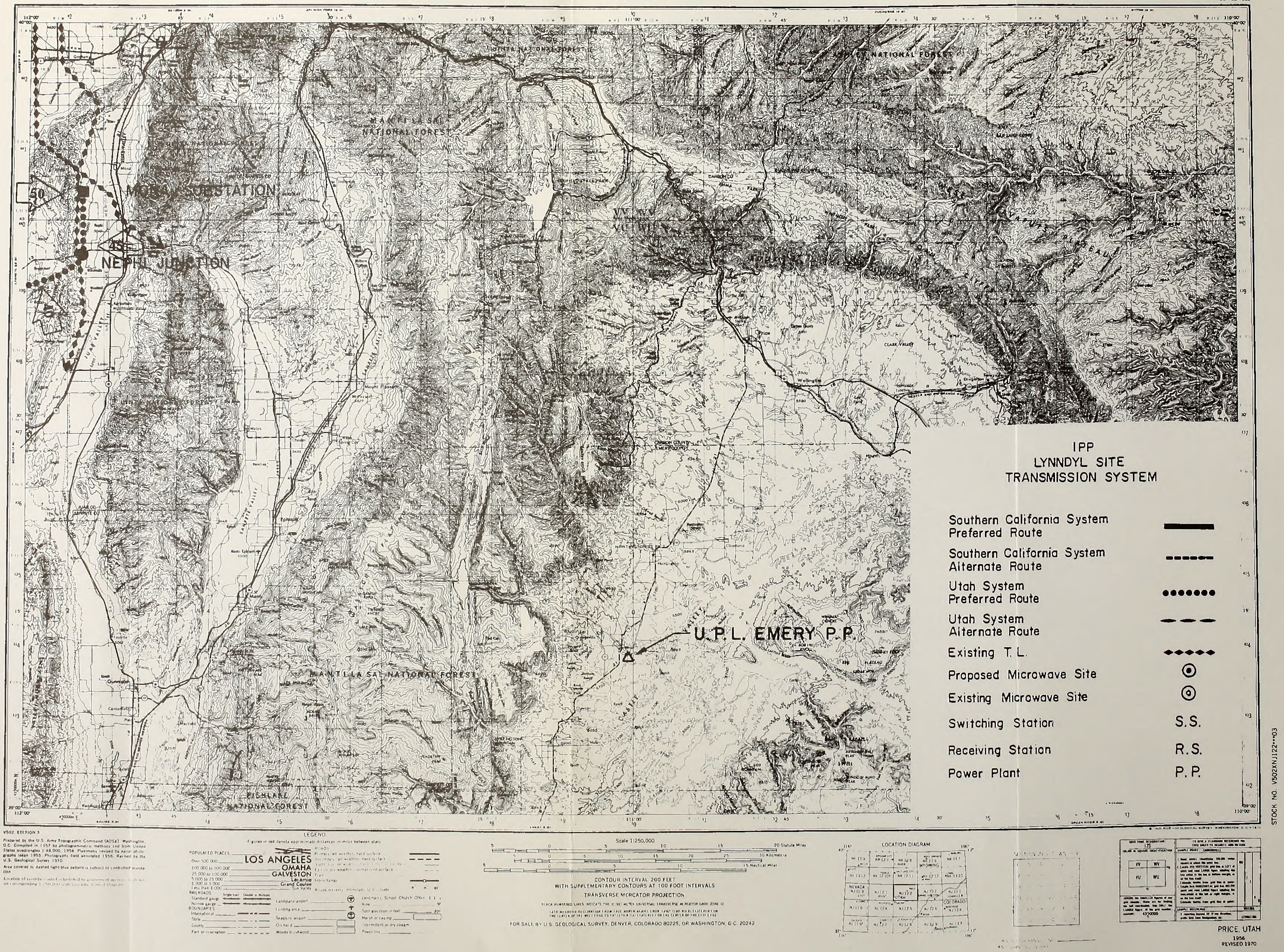
ELY, NEVADA; UTAH
1956
REVISED 1971

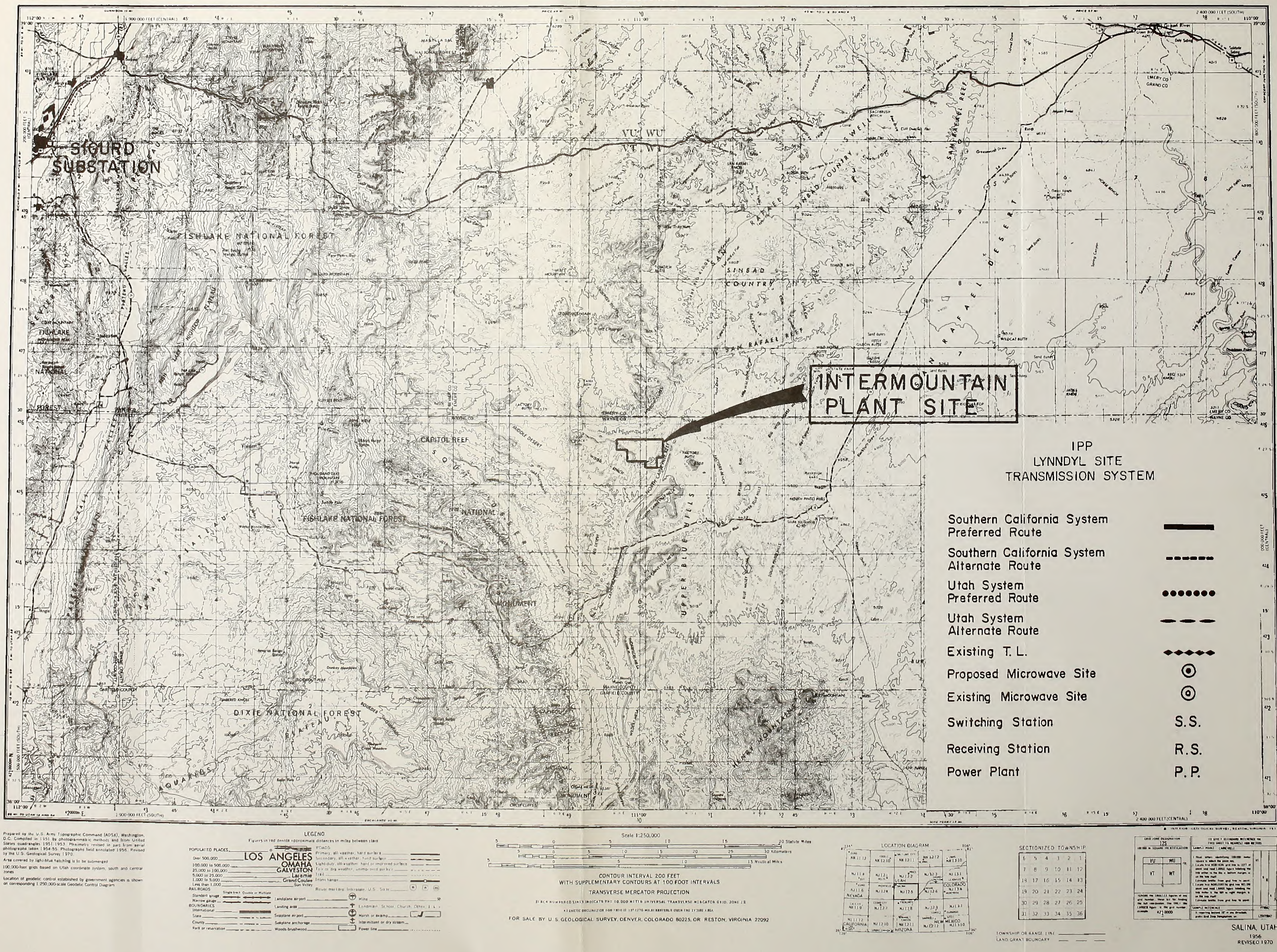
WESTERN UNITED STATES 1:250,000

PRICE

EDITION 3

NJ 12-2
SERIES V502

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SAN RAFAEL DESERT
CAPITOL REEF NATIONAL MONUMENT
DIXIE NATIONAL FOREST
AQUARIUS PLATEAU
UPPER BLUE HILLS
HENRY MOUNTAINS
IPP
LYNNDYL SITE
TRANSMISSION SYSTEM
Southern California System Preferred Route
Southern California System Alternate Route
Utah System Preferred Route
Utah System Alternate Route
Existing T. L.
Proposed Microwave Site
Existing Microwave Site
Switching Station S.S.
Receiving Station R.S.
Power Plant P.P.
Scale 1:250,000
CONTOUR INTERVAL 200 FEET
WITH SUPPLEMENTARY CONTOURS AT 100 FOOT INTERVALS
TRANSVERSE MERCATOR PROJECTION
FOR SALE BY U. S. GEOLOGICAL SURVEY, DENVER, COLORADO 80225, OR RESTON, VIRGINIA 22092
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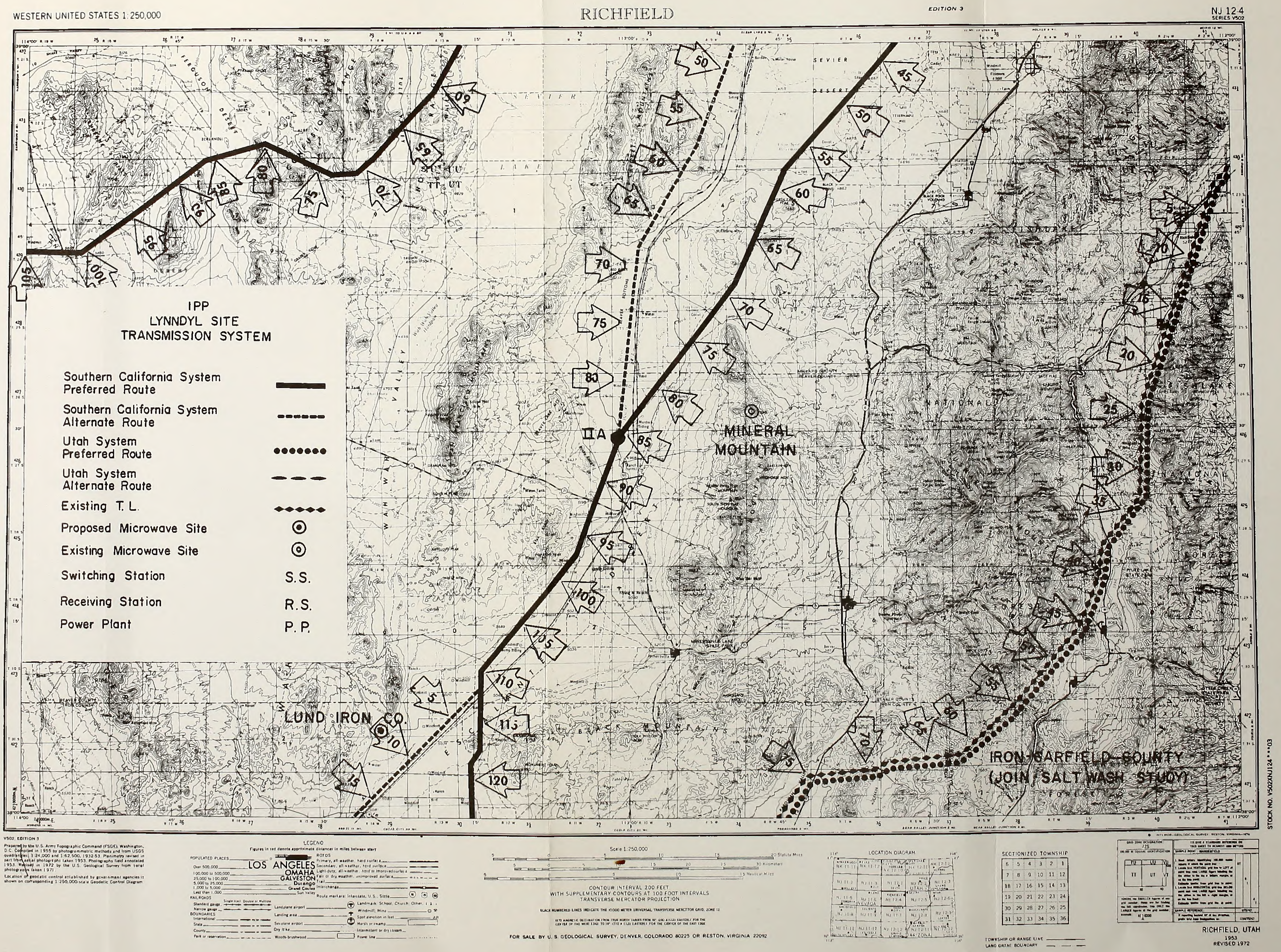
SALINA, UTAH
1956
REVISED 1970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RICHFIELD
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SERIES V502
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Southern California System Alternate Route
Utah System Preferred Route
Utah System Alternate Route
Existing T. L.
Proposed Microwave Site
Existing Microwave Site
Switching Station S.S.
Receiving Station R.S.
Power Plant P.P.
IIA
MINERAL MOUNTAIN
LUND IRON CO.
IRON-GARFIELD COUNTY
(JOINT SALT WASH STUDY)
SEVIER DESERT
LEGEND
LOS ANGELES
OMAHA
CONTOUR INTERVAL 200 FEET
WITH SUPPLEMENTARY CONTOURS AT 100 FOOT INTERVALS
TRANSVERSE MERCATOR PROJECTION
FOR SALE BY U. S. GEOLOGICAL SURVEY, DENVER, COLORADO 80225 OR RESTON, VIRGINIA 22092
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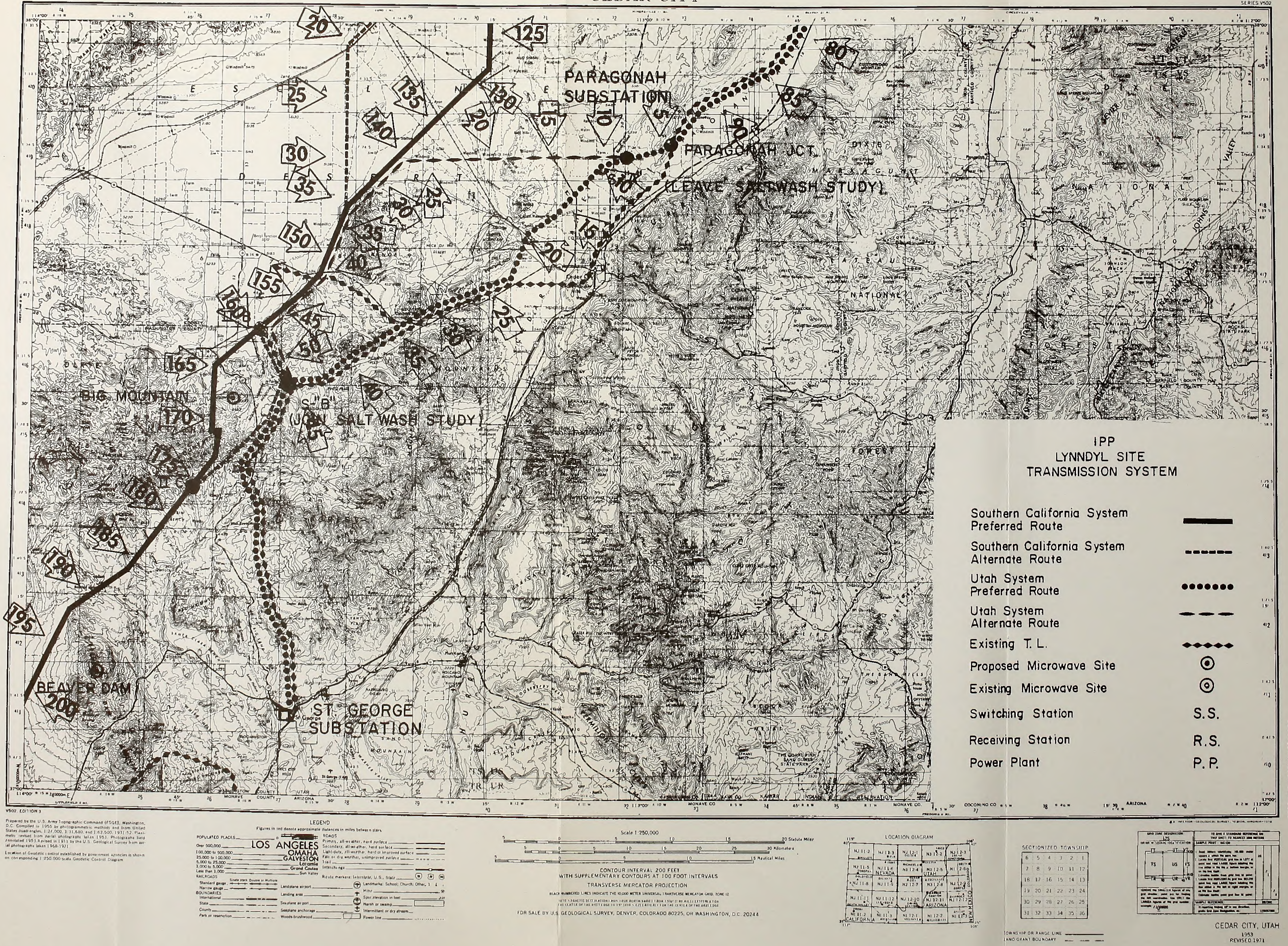
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PARAGONAH JCT.
(LEAVE SALTWASH STUDY)
BIG MOUNTAIN
S."B"
(JOIN SALT WASH STUDY)
BEAVER DAM
ST. GEORGE SUBSTATION
IPP
LYNNDYL SITE
TRANSMISSION SYSTEM
Southern California System Preferred Route
Southern California System Alternate Route
Utah System Preferred Route
Utah System Alternate Route
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Receiving Station R.S.
Power Plant P.P.
STOCK NO. V502XNJ127***03
CONTOUR INTERVAL 200 FEET
WITH SUPPLEMENTARY CONTOURS AT 100 FOOT INTERVALS
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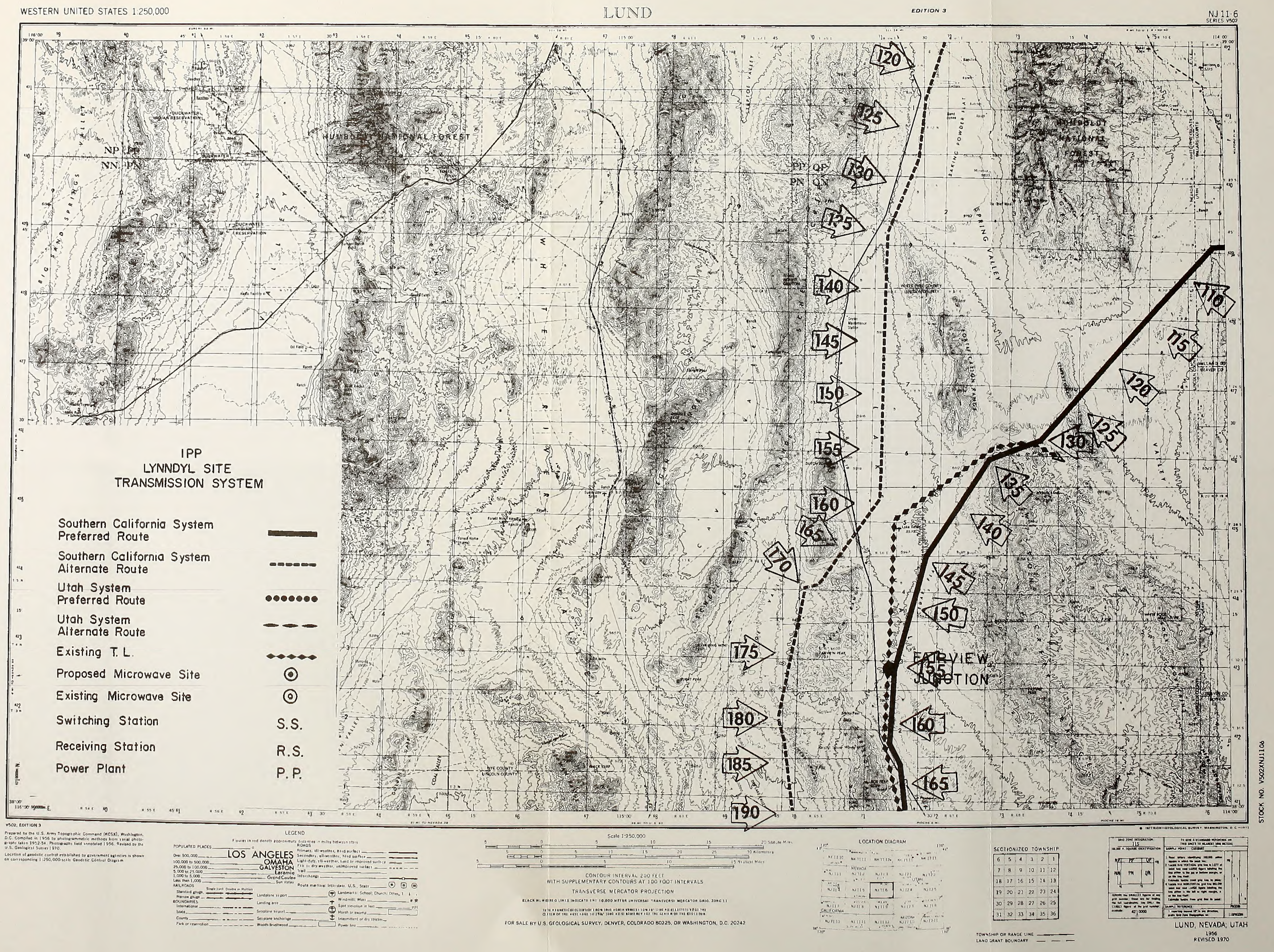
CEDAR CITY, UTAH
1953
REVISED 1971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LUND
EDITION 3
NJ 11-6
SERIES V502
IPP
LYNNDYL SITE
TRANSMISSION SYSTEM
Southern California System Preferred Route
Southern California System Alternate Route
Utah System Preferred Route
Utah System Alternate Route
Existing T. L.
Proposed Microwave Site
Existing Microwave Site
Switching Station S.S.
Receiving Station R.S.
Power Plant P.P.
HUMBOLDT NATIONAL FOREST
SPRING VALLEY
FAIRVIEW JUNCTION
CONTOUR INTERVAL 200 FEET
WITH SUPPLEMENTARY CONTOURS AT 100 FOOT INTERVALS
TRANSVERSE MERCATOR PROJECTION
FOR SALE BY U.S. GEOLOGICAL SURVEY, DENVER, COLORADO 80225, OR WASHINGTON, D.C. 20242
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LUND, NEVADA; UTAH
1956
REVISED 1970
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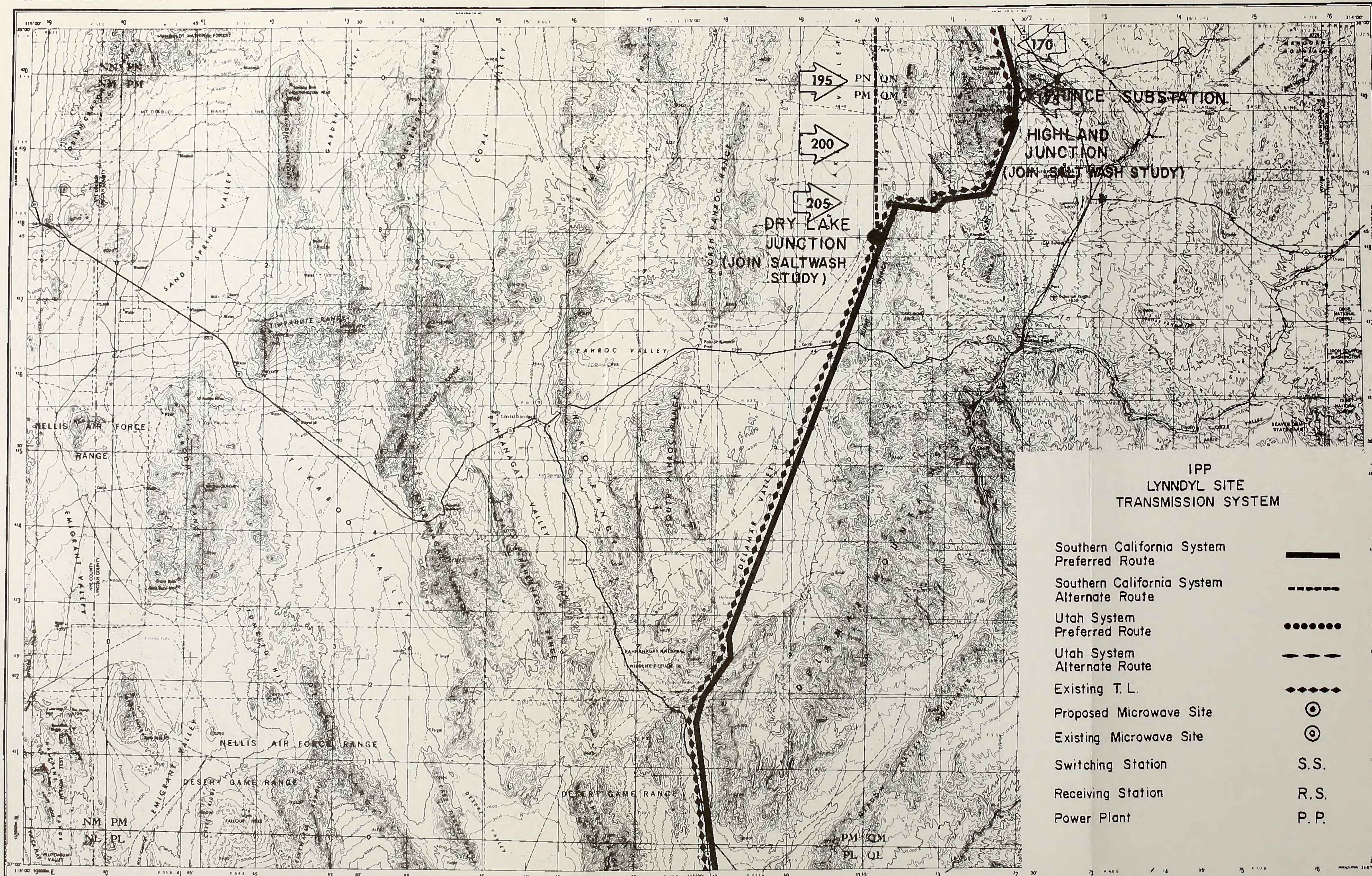
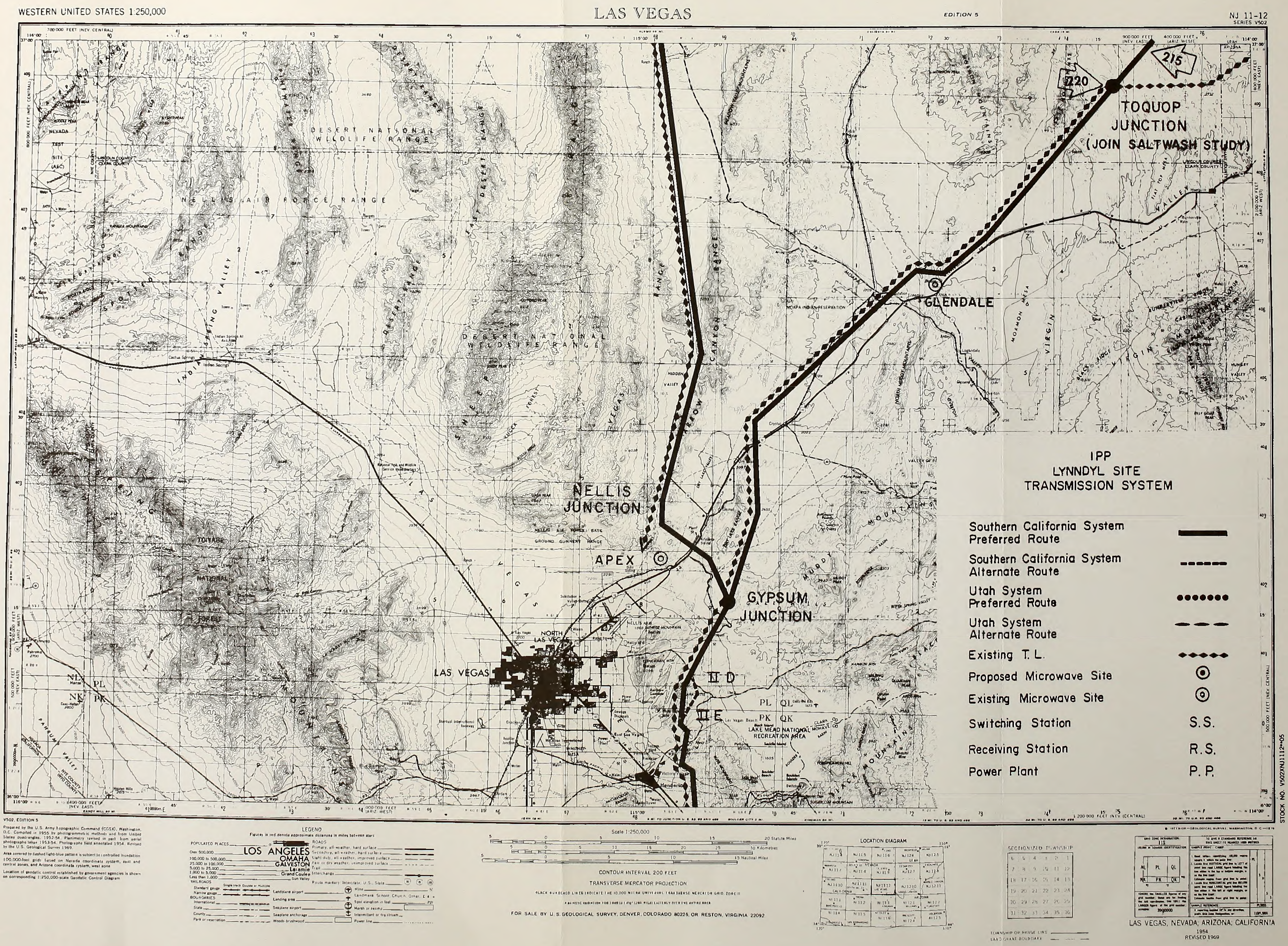


CONTOUR INTERVAL 200 FEET

TRANSVERSE MERCATOR PROJECTION

FOR SALE BY U.S. GEOLOGICAL SURVEY, DENVER, COLORADO 80225, OR WASHINGTON, D.C. 20242

CALIENTE, NEVADA; UTAH
1954
REVISED 1970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LAS VEGAS
EDITION 5
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TOQUOP
JUNCTION
(JOIN SALTWASH STUDY)
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NELLIS
JUNCTION
APEX
GYPSUM
JUNCTION
LAS VEGAS
NORTH LAS VEGAS
DESERT NATIONAL WILDLIFE RANGE
NELLIS AIR FORCE RANGE
LAKE MEAD NATIONAL RECREATION AREA
IPP
LYNNDYL SITE
TRANSMISSION SYSTEM
Southern California System Preferred Route
Southern California System Alternate Route
Utah System Preferred Route
Utah System Alternate Route
Existing T.L.
Proposed Microwave Site
Existing Microwave Site
Switching Station
S.S.
Receiving Station
R.S.
Power Plant
P.P.
CONTOUR INTERVAL 200 FEET
TRANSVERSE MERCATOR PROJECTION
FOR SALE BY U.S. GEOLOGICAL SURVEY, DENVER, COLORADO 80225, OR RESTON, VIRGINIA 22092
LAS VEGAS, NEVADA; ARIZONA; CALIFORNIA
1954
REVISED 1969
STOCK NO. V502XNJ1112-05

APENDIX VIII.1-4

Land Status of Right-of-Way
In the Transmission System

	Miles of Right-of-Way							Acres	
	Total By Section	Public Lands BLM[a]	Bureau of Reclamation	USFS	State	Private	County[b]	Occupied by Poles and Footings	Right-of-Way Corridor Applied for by IPP
California System Northern Transmission Route (Line 1)									
a. Segments Independant of Salt Wash Proposed Line I									
Lynndyl to Little Drum Junction One new 500 kV d.c. line, one 230 kV a.d. line for Utah Transmission System	24	19		1 (Ut)		4	24 (Mil.)	8	800
Little Drum Junction to Highland Junction, One new 500 kV d.c. line	153	71 (Ut) 70 (Nv)			12 (Ut)		83 (Mil.) 3 (Wt. Pn) 67 (Lin.)	25	3,709
b. Segments in Common with Salt Wash Proposed Line I									
Highland Junction to Gypsum Junction One new 500 kV d.c. line	123	123 (Nv)					80 (Lin.) 43 (Clrk)	20	3,200
Eldorado Juntion to Victorville One new 500 kV d.c. line	168	26 (Nv)			6 (Ca)	21	53 (Clrk) 115 (Sn. Brdo.)	27	4,073
TOTAL	468	424			19	25	468	80	11,782
Southern Transmission System (Line II)									
a. Segment Independant of Salt Wash Proposed Line II									
Lynndyl to U.P. Junction	8	8 (Ut)					8 (Mil.)	5	303
U.P. Junction to Toquop Junction one new 500 kV d.c. line	210	113 (Ut)		11 (Ut)	17 (Ut)	56	70 (Mil.) 34 (Beav.) 47 (Iron) 46 (Wash.) 13 (Linc.)	34	485
b. Segment in Common With Salt Wash Proposed Line II									
Toquop Junction to Gypsum Junction one new 500 kV d.c. line	62	59 (Nv.)	1			2	8 (Linc) 54 (Clrk)	10	977
Eldorado Junction to Victorville, one 500 kV d.c. line	178	119 (Ca) 27 (Nv)			5 (Ca)	27	27 (Clrk) 151 (Sn. Brdo)	29	4,315
TOTAL	458	339	1	11	22	85	458	78	6,080

APPENDIX VIII.1-4 (continued)

	Miles of Right-of-Way: Total By Segment	Public Lands BLM[a]	Bureau of Reclamation	USFS	State	Private	County[b]	Acres: Occupied by Poles and Footings	Acres: Right-of-Way Corridor Applied for by IPP
Common Route: Common to Both Salt Wash and Lynndyl Transmission Systems, Lines I and II									
Gypsum Junction to Eldorado Junction, two 500 kV d.c. lines	38	29 (Nv)	4 (Nv)			5	38 (Clrk)	12	1,520
Southern California Transmission System									
Totals	964	[a]792	5	11	30 (Ut)	115	[b]964	170[c]	19,382
Utah Transmission System									
Lynndyl to U.P. Junction, two 345 kV a.c. lines[d]	8	8 (Ut)					8 (Mil)	3[f]	291
U. P. Junction to Mona Substation two 345 kV a.c. lines	42	14 (Ut)		3 (Ut)	2 (Ut)	23	12 (Mil) 30 (Juab)	18	1,527
Lynndyl to Little Drum Juncton, one 230 kV a.c. line[d]	24	19 (Ut)			1 (Ut)	4	24 (Mil)	3	320
Little Drum Junction to Gonder Substation, one 230 kV a.c. line	120	57 (Ut) 44 (Nv)		8 (Nv)		5	65 (Mil) 55 (Wht. Pn)	17	1,600
Sigurd Substation to Paragonah Substation one 230 kV a.c. line	92	43 (Ut)		6 (Ut)	8 (Ut)	35	25 (Sev) 30 (Piu) 8 (Gar) 29 (Iron)	13	1,227
Paragonah Substation to St. George Sub-station, one 230 kV a.c. line	77	21 (Ut)		24 (Ut)	3 (ut)	29	41 (Iron) 36 (Wash)	11	1,027
Utah Transmission System Totals	363	162 (Ut) 44 (Nv)		33 (Ut)	20 (Ut)	96	109 (Mil) 30 (Juab) 25 (Sev) 30 (Piu) 8 (Gar) 70 (Iron) 36 (Wash) 55 (Wht. Pine)	65	5,993
	(331)[e]	(179)[e]		(41)[c]	(19)[c]	(92)[e]	(77 Millard) (30 Juab) (25 Sevier) (30 Piute) (8 Garfield) (70 Iron) (36 Washington) (55 White Pine)	(59)[e]	(5,381)[e]

[a]Southern California Transmission System public land administered by the BLM, divided by State: 208 miles Utah State Office, 350 miles Nevada State Office, 234 miles California State Office.

[b]Southern California Transmission System, all lands divided by counties within each State: 312 miles in Utah (185, Millard Co., 34 Beaver County, 47 Iron County, 46 Washington County.)
386 miles in Nevada (3 White Pine County, 168 Lincoln County, 215 Clark County.) 266 miles in California (266 San Bernardino County).

[c]Includes 6 acres occupied by poles and footings of the Utah Transmission System in common corridors with the Southern California Transmission System.

[d]The totals for these segments of the Utah Transmission System are included in the totals of the Southern California Transmission System.

[e]Figures in parenthesis are totals for the independant segments of the Utah Transmission System and are additions to Southern California Transmission System totals.

APPENDIX VIII.2-1

Highly Significant Fossil Bearing Formations
Along Preferred Transmission Lines

Formation	Line Segment	Mileposts	Types of Fossils	Significance Criteria
Lower Pogonip Group	Lynndyl-Highland	57-61, 63-65	Invertebrate Fossils	Number and variety of fossils found in these rocks.
Eureka Formation and Pogonip Group	Lynndyl-Gonder	121-122	Invertebrate Fossils	Number and variety of fossils found in these rocks.
Tertiary Lake Sediments	Eldorado-Victorville (2)	105-107	Mammalian fossil material, fresh water invertebrates, plant fossils	Important data on poorly understood fauna could be destroyed. Significance of fossils is high, abundance is low.
Tertiary Non-Marine Sediments	Eldorado-Victorville (1)	60-62, 63-64	Mammalian fossils	Important in establishing age relationships of various deposits.
Miocene Non-Marine	Eldorado-Victorville (1)	99-100, 109-110, 123-124, 138-140	Mammalian fossils	Contributes to an understanding of the poorly-known fauna of this age.

APPENDIX VIII.2-2

Vegetation Associated With Wetlands in Delta, Utah Vicinity

Genus Species	Common Name
Allenrolfea occidentalis	Pickleweed
Atriplex canescens	Fourwing saltbush
Atriplex confertifolia	Shadscale
Atriplex falcata	Mound saltbush
Bassia hyssopifolia	Smotherweed
Bromus tectorum	Cheatgrass
Carex sp.	Sedge
Chrysothamus nauseosus	Big rabbitbrush
Distichlis stricta	Saltgrass
Elaeagnus angustifolia	Russian olive
Elymus triticoides	Beardless wildrye
Ephedra sp.	Mormon tea
Eriogonum wrightii	Wright's eriogonum
Gutierrezia sarothrae	Snakeweed
Halogeton glomeratus	Halogeten
Hilaria jamesii	Galleta
Hordeum jubatum	Foxtail barley
Juncus balticus	Wire rush
Kochia americana	Gray molly
Oryzopsis hymenoides	Indian ricegrass
Phragmites communis	Common reed
Poa juncifolia	Alkali bluegrass
Potamogeton pectinatus	Sago pondweed
Psoralea sp.	Scurfpea
Puccinellia airoides	Alkaligrass
Salicornia rubra	Red samphire
Salicornia utahensis	Utah samphire
Salix sp.	Willow
Salsola kali var. tenuifolia	Russian thistle
Sarcobatus vericulatus	Greasewood
Scirpus sp.	Bulrush
Sitanion hystrix	Squirreltail
Sphaeralcea sp.	Globemallow
Sporobolus airoides	Alkali sacaton
Suaeda torreyana	Seepweed
Tamarix pentandra	Tamarisk
Tetradymia sp.	Horsebrush
Typha latifolia	Common cattail

APPENDIX VIII.2-3

Listed, Proposed, and Candidate, Threatened and Endangered Plant Species Within the Lynndyl Regional Setting

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Officially Listed Plant Species

Astragalus perianus

Proposed Endangered Plant Species

Astragalus deserticus
Astragalus loanus
Cuscuta warneri
Eriogonum ammophilum
Penstemon concinnus

Candidate Threatened or Endangered Plant Species

Astragalus callithrix (E)
Castilleja parvula (T)
Cryptantha compacta (T)
Cymopterus coulteri (T)
Draba sobolifera (T)
Draba zionensis (T)
Eriogonum natum (T)
Eriogonum ostlundii (T)
Eriogonum panguicense var. *panguicense* (T)
Lepidium montanum var. *neeseae* (T)
Mentzelia argillacea (T)
Penstemon nanus (T)
Penstemon tidestromii (T)
Penstemon wardii (T)
Phacelia utahensis (T)
Silene petersonii var. *petersonii* (T)
Sphaeralcia caespitosa (T)

Listed, Proposed, and Candidate, Threatened and Endangered Plant Species Along Proposed Lynndyl Power Line Corridor

UTAH

Officially Listed Plant Species

None

Proposed Endangered Plant Species

Cuscuta warneri
Eriogonum ammophilum
Penstemon concinnus

Candidate Threatened or Endangered Plant Species

- Astragalus callithrix (E)
- Cryptantha compacta (T)
- Lepidium montanum var. neeseae (T)
- Phacelia anelsonii (T)
- Sphaeralcia caespitosa (T)

NEVADA (to Dry Lake Junction Line I, and Toquop Junction Line II)

Officially List Plant Species

None

Proposed Endangered Plant Species

- Mentzelia leucophylla

Candidate Threatened or Endangered Plant Species

- Astragalus conuallarius var. finitimus (T)
- Astragalus lentiginosus var. latus (T)
- Cymopterus basalticus (T)
- Phlox gladiformis (T)

(T) = Threatened, (E) = Endangered.

APPENDIX VIII.3-1

Stack Parameters and Worst-Case Emissions Data
for the IPP Power Plant at Lynndyl Site

Parameter	Parameter Value	
	Stack No. 1	Stack No. 2
Stack Height (m)	216	216
Stack Inner Diameter[a] (m)	12.9	12.9
UTM X Coordinate (m)	363,450	363,650
UTM Y Coordinate (m)	4,374,270	4,374,270
Stack Base Elevation (m above MSL)	1,420	1,420
Volumetric Emission Rate (m^3/sec)	2,718	2,718
Stack Exit Temperature (°K)	350	350
Stack Exit Velocity (m/sec)	21	21
SO_2 Emission Rate (g/sec)		
Maximum Short-Term	292.4	292.4
Annual Average	248.5	248.5
Particulate Emission Rate[b] (g/sec)		
Maximum Short-Term	37.4	37.4
Annual Average	31.8	31.8
Annual Average NO_2 Emission Rate[c] (g/sec)	1,123.7	1,123.7

Source: Bowers, et al., 1978a.

[a]Effective diameter for two inner flues with diameters of 9.1 meters.

[b]The particulate emission rates assume that 20 percent of the flyash is contained in the bottom ash and 80 percent is contained in the flue gas.

[c]The NO_2 emission rate assumes 100 percent conversion of NO to NO_2.

APPENDIX VIII.3-2

Annual Joint Frequency of Occurrence of Wind Speed and Wind Direction at the Delta, Utah Airport

Direction (sector)	Wind Speed (M/sec) Stability Category A 0-1.5	1.6-3.0	Total	Stability Category B 0-1.5	1.6-3.0	3.1-5.1	Total
N	.0013	.0002	.0015	.0044	.0011	.0006	.0061
NNE	.0010	.0002	.0013	.0032	.0010	.0004	.0046
NE	.0011	.0001	.0012	.0053	.0005	.0001	.0059
ENE	.0004	.0001	.0004	.0025	.0003	.0001	.0030
E	.0005	.0001	.0006	.0026	.0002	.0001	.0029
ESE	.0004	.0001	.0005	.0013	.0002	.0000	.0015
SE	.0006	.0000	.0007	.0039	.0007	.0001	.0047
SSE	.0009	.0001	.0010	.0047	.0008	.0005	.0068
S	.0013	.0002	.0016	.0073	.0014	.0009	.0096
SSW	.0020	.0006	.0026	.0091	.0029	.0021	.0141
SW	.0041	.0009	.0050	.0105	.0037	.0030	.0173
WSW	.0026	.0008	.0035	.0053	.0026	.0020	.0099
W	.0020	.0006	.0026	.0046	.0017	.0012	.0074
WNW	.0019	.0006	.0024	.0056	.0022	.0013	.0091
NW	.00017	.0003	.0020	.0053	.0019	.0009	.0080
NNW	.0011	.0004	.0015	.0056	.0019	.0012	.0088
Total	.0029	.0053	.0282	.0812	.0231	.0144	.1188

Direction (sector)	Wind Speed (M/sec) Stability Category C 0-1.5	1.6-3.0	3.1-5.1	5.2-8.2	8.3-10.8	>10.8	Total
N	.0020	.0017	.0025	.0001	.0001	.0000	.0064
NNE	.0012	.0013	.0017	.0001	.0000	.0000	.0042
NE	.0026	.0012	.0011	.0000	.0000	.0000	.0050
ENE	.0017	.0008	.0006	.0000	.0000	.0000	.0031
E	.0015	.0007	.0002	.0000	.0000	.0000	.0024
ESE	.0006	.0003	.0002	.0000	.0000	.0000	.0011
SE	.0018	.0008	.0009	.0001	.0000	.0000	.0036
SSE	.0020	.0016	.0022	.0001	.0000	.0000	.0059
S	.0034	.0025	.0049	.0004	.0003	.0001	.0116
SSW	.0029	.0035	.0090	.0010	.0010	.0010	.0184
SW	.0037	.0030	.0071	.0010	.0007	.0006	.0161
WSW	.0012	.0016	.0042	.0006	.0002	.0001	.0079
W	.0015	.0012	.0020	.0001	.0000	.0000	.0048
WNW	.0013	.0015	.0025	.0001	.0000	.0000	.0054
NW	.0015	.0015	.0029	.0001	.0000	.0000	.0053
NNW	.0018	.0018	.0048	.0003	.0002	.0001	.0089
Total	.0307	.0249	.0467	.0040	.0026	.0019	.1107

APPENDIX VIII.3-2 (concluded)

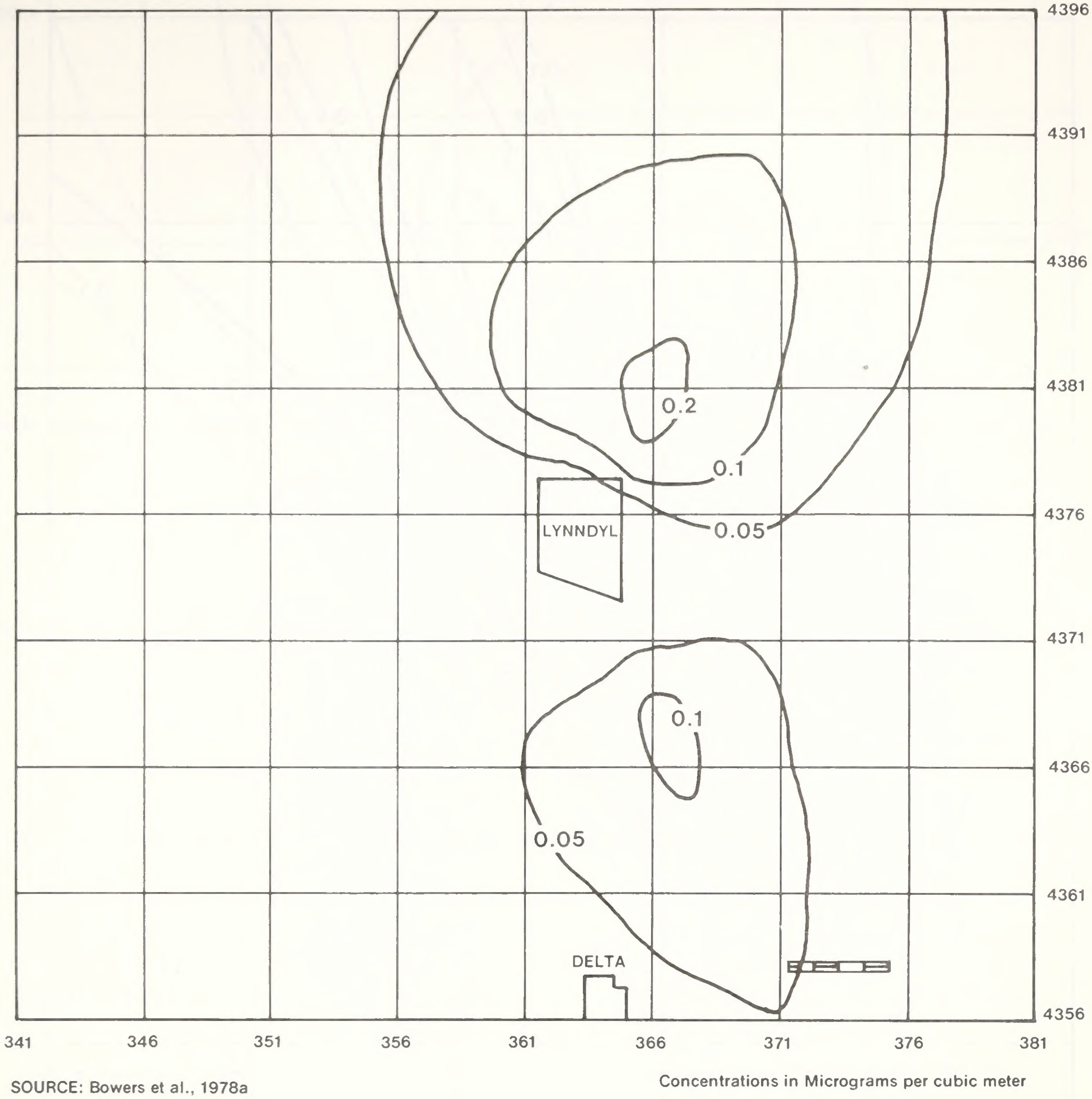
Direction (sector)	Wind Speed (M/sec) Stability Category D 0-1.5	1.6-3.0	3.1-5.1	5.2-8.2	8.3-10.8	>10.8	Total
N	.0018	.0020	.0085	.0058	.0021	.0006	.0208
NNE	.0015	.0013	.0064	.0036	.0010	.0003	.0141
NE	.0025	.0020	.0058	.0022	.0004	.0001	.0130
ENE	.0012	.0016	.0027	.0008	.0002	.0000	.0065
E	.0015	.0011	.0020	.0002	.0000	.0000	.0048
ESE	.0008	.0006	.0014	.0006	.0001	.0000	.0035
SE	.0019	.0015	.0070	.0020	.0005	.0001	.0138
SSE	.0021	.0024	.0202	.0123	.0028	.0007	.0407
S	.0034	.0030	.0200	.0165	.0076	.0031	.0536
SSW	.0027	.0038	.0154	.0197	.0168	.0144	.0728
SW	.0028	.0025	.0051	.0078	.0050	.0045	.0281
WSW	.0014	.0014	.0025	.0025	.0015	.0005	.0098
W	.0015	.0010	.0013	.0007	.0002	.0000	.0047
WNW	.0013	.0010	.0023	.0013	.0004	.0002	.0064
NW	.0023	.0018	.0050	.0039	.0022	.0044	.0150
NNW	.0020	.0024	.0113	.0105	.0099	.0021	.0332
Total	.0304	.0292	.1177	.0913	.0488	.0268	.3413

Direction (sector)	Wind Speed (M/sec) Stability Category E 1.6-3.0	3.1-5.1	Total	Stability Category F 0-1.5	1.6-3.0	Total	Annual Wind Direction Distrib.
N	.0026	.0064	.0090	.0122	.0057	.0179	.0617
NNE	.0026	.0074	.0100	.0127	.0072	.0199	.0541
NE	.0048	.0117	.0166	.0337	.0165	.0502	.0918
ENE	.0035	.0048	.0083	.0180	.0105	.0285	.0498
E	.0028	.0018	.0046	.0175	.0062	.0237	.0390
ESE	.0014	.0017	.0032	.0069	.0026	.0096	.0193
SE	.0025	.0067	.0092	.0135	.0052	.0187	.0507
SSE	.0041	.0169	.0210	.0156	.0074	.0230	.0975
S	.0043	.0136	.0179	.0160	.0075	.0235	.1178
SSW	.0031	.0054	.0085	.0112	.0052	.0164	.1327
SW	.0022	.0020	.0042	.0094	.0027	.0120	.0826
WSW	.0008	.0004	.0012	.0029	.0008	.0037	.0361
W	.0004	.0004	.0008	.0033	.0008	.0041	.0244
WNW	.0007	.0005	.0012	.0038	.0013	.0051	.0297
NW	.0012	.0019	.0031	.0062	.0021	.0082	.0429
NNW	.0019	.0042	.0061	.0074	.0043	.0117	.0701
Total	.0389	.0859	.1248	.1903	.0860	.2763	

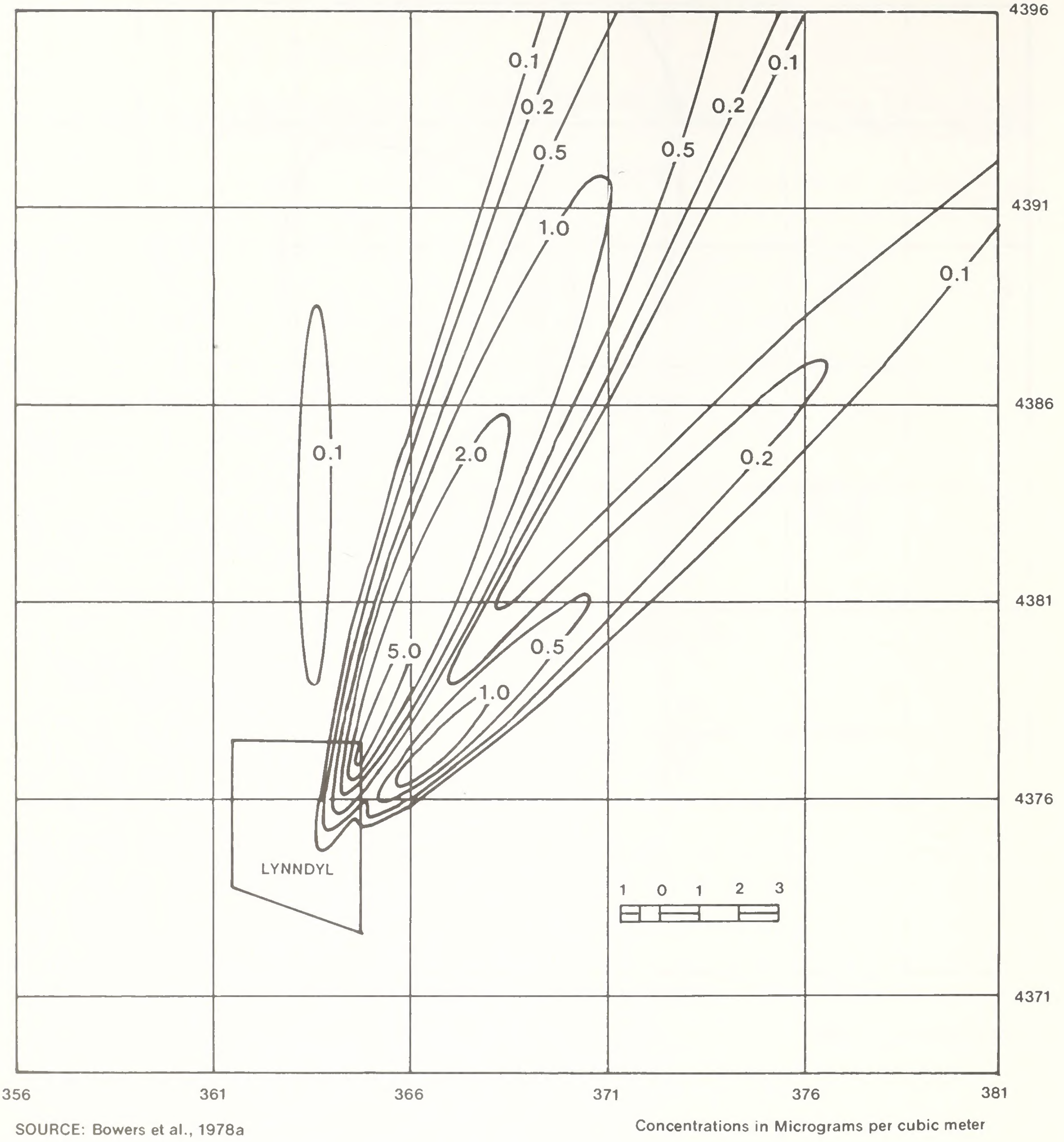
APPENDIX VIII.3-3

Seasonal Median Mixing Depths in Meters
Based on Salt Lake City Data

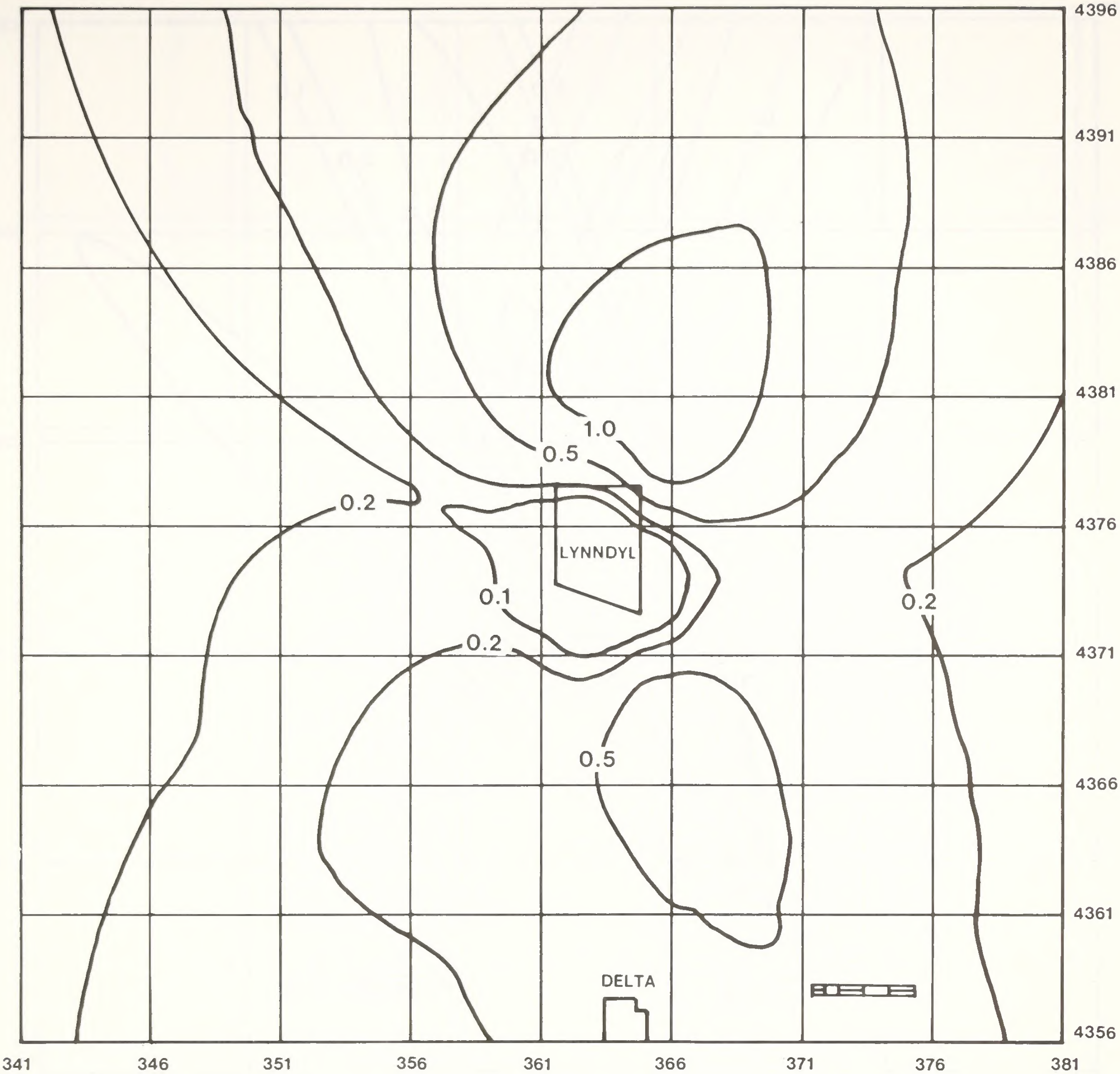
Pasquill Stability Category	Wind Speed (m/sec) 0.0-1.5	1.6-3.0	3.1-5.1	5.2-8.2	8.3-10.8	>10.8
			(a) Winter			
A	400	550	---	---	---	---
B	400	550	800	---	---	---
C	400	550	800	1,000	1,000	1,000
D	265	340	460	675	675	840
E	---	125	125	---	---	---
F	125	125	---	---	---	---
			(b) Spring			
A	2,000	2,250	---	---	---	---
B	2,000	2,250	2,500	---	---	---
C	2,000	2,250	2,500	2,500	2,500	2,500
D	1,060	1,190	1,310	1,350	1,425	1,950
E	---	125	125	---	---	---
F	125	125	---	---	---	---
			(c) Summer			
A	2,500	2,900	---	---	---	---
B	2,500	2,900	3,500	---	---	---
C	2,500	2,900	3,500	3,700	4,000	4,000
D	1,310	1,510	1,810	1,950	2,250	2,400
E	---	125	125	---	---	---
F	125	125	---	---	---	---
			(d) Fall			
A	800	1,250	---	---	---	---
B	800	1,250	1,600	---	---	---
C	800	1,250	1,600	2,000	2,250	2,500
D	460	690	860	1,125	1,275	1,625
E	---	125	125	---	---	---
F	125	125	---	---	---	---



CALCULATED ISOPLETHS: ANNUAL AVERAGE GROUND LEVEL PARTICULATE CONCENTRATIONS



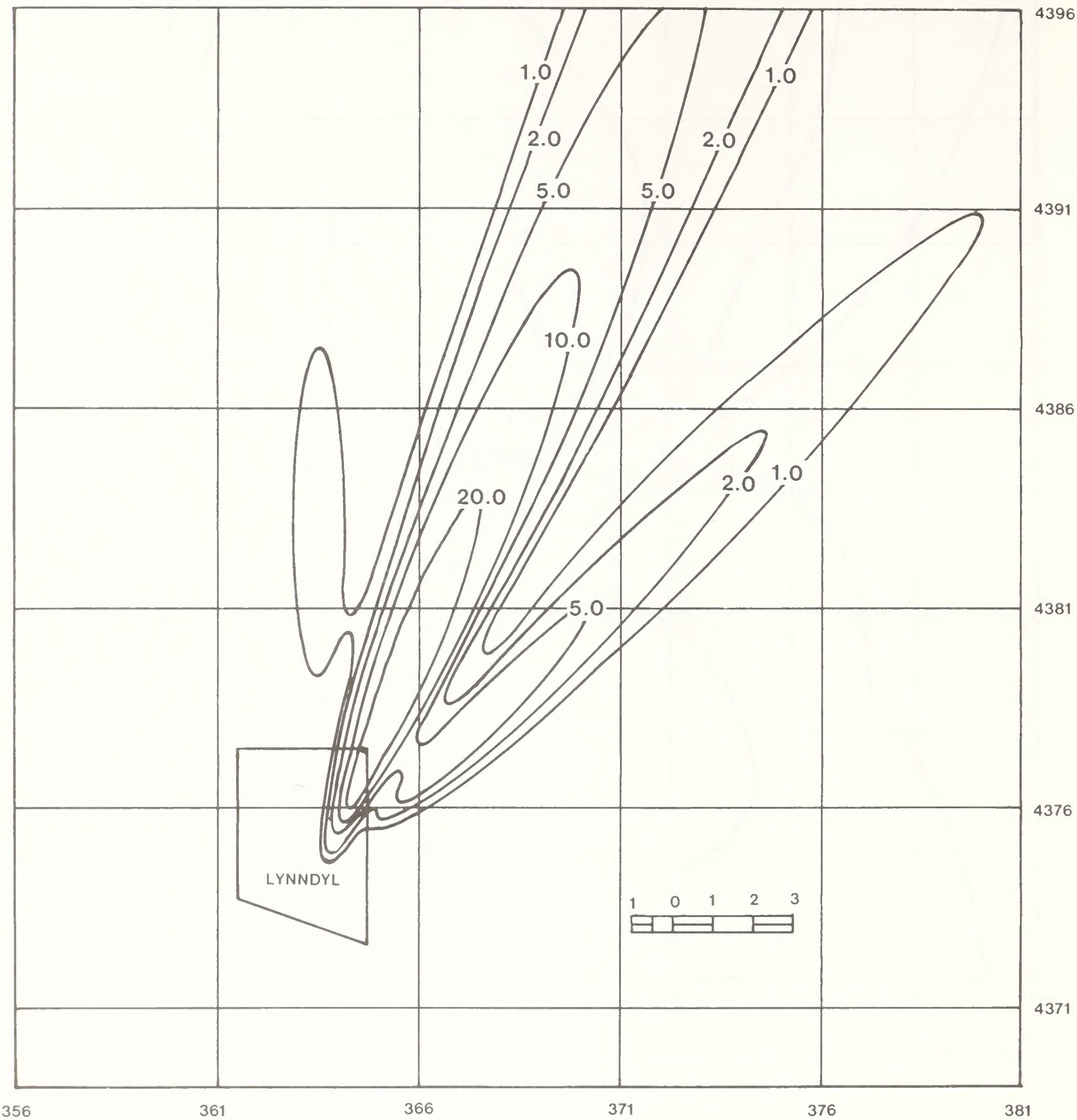
CALCULATED ISOPLETHS:
MAXIMUM 24-HOUR AVERAGE
GROUND LEVEL PARTICULATE CONCENTRATIONS



SOURCE: Bowers et al., 1978a

Concentrations in Micrograms per cubic meter

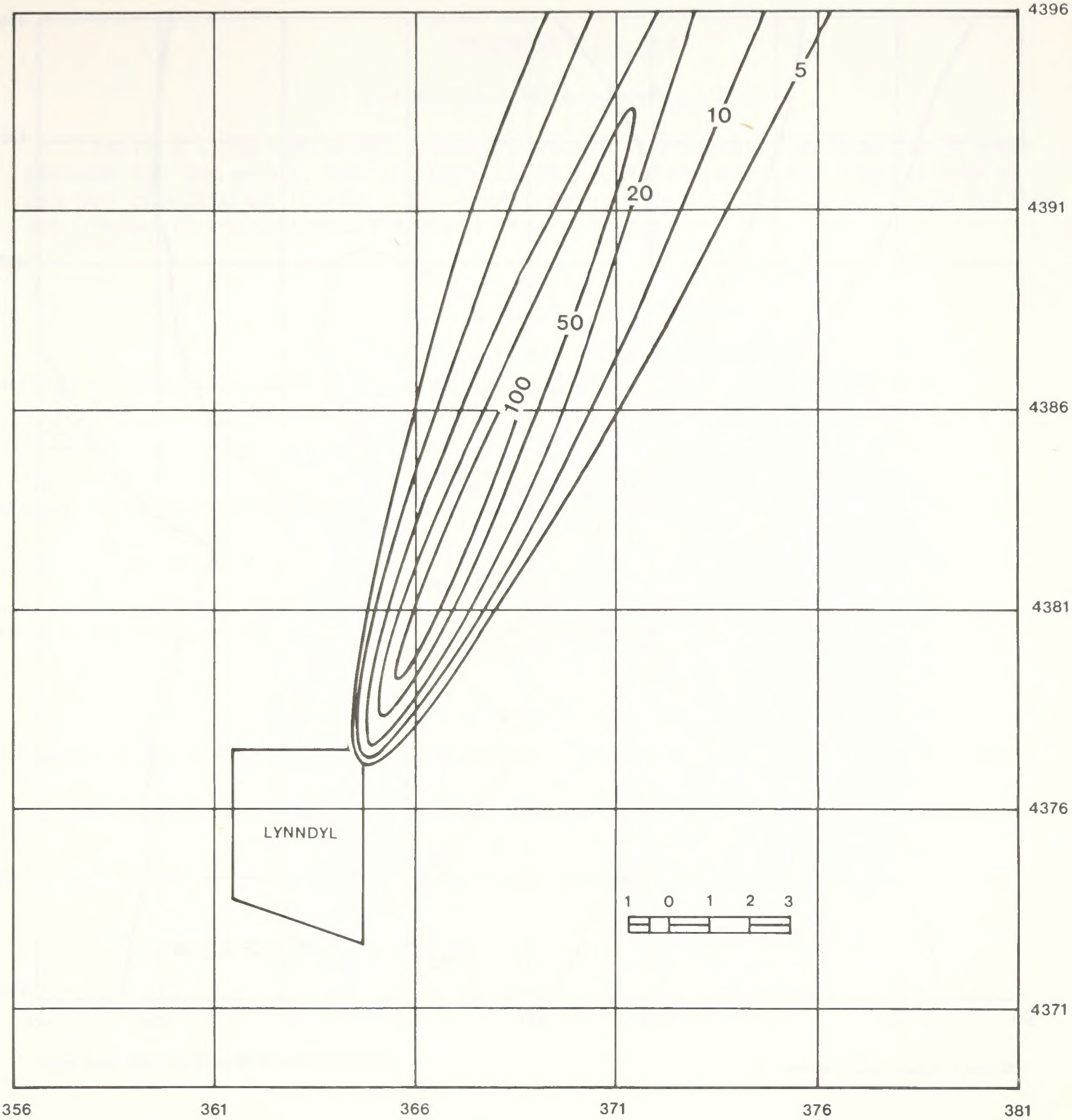
CALCULATED ISOPLETHS:
AVERAGE ANNUAL GROUND LEVEL SO_2 CONCENTRATIONS



SOURCE: Bowers et al., 1978a

Concentrations in Micrograms per cubic meter

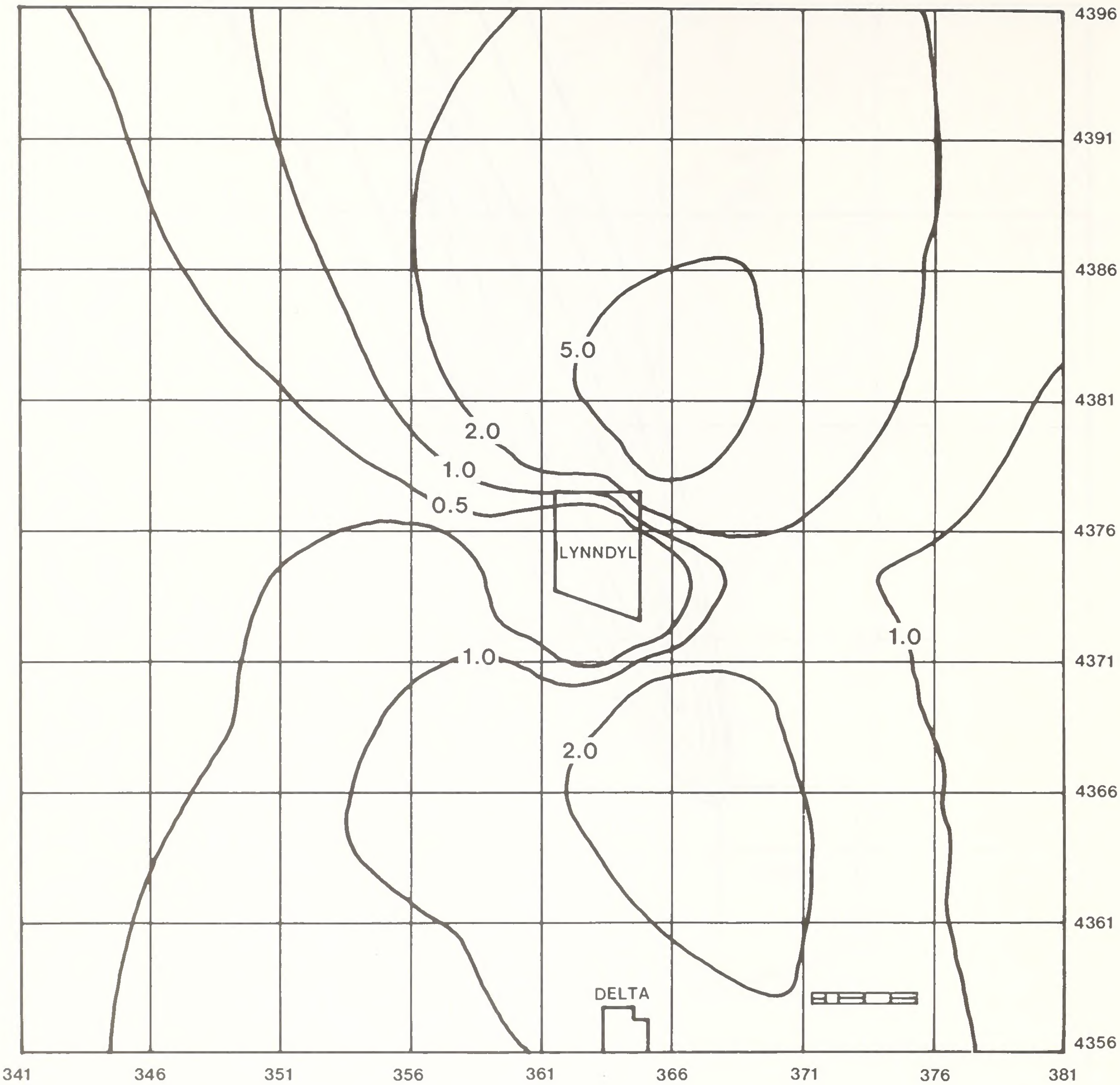
CALCULATED ISOPLETHS: MAXIMUM 24-HOUR AVERAGE GROUND LEVEL SO_2 CONCENTRATIONS



SOURCE: Bowers et al ., 1978a

Concentrations in Micrograms per cubic meter

CALCULATED ISOPLETHS: MAXIMUM 3-HOUR AVERAGE GROUND LEVEL SO_2 CONCENTRATIONS



SOURCE: Bowers et al., 1978a

Concentrations in Micrograms per cubic meter

CALCULATED ISOPLETHS: ANNUAL AVERAGE GROUND LEVEL NO_2 CONCENTRATIONS

APPENDIX VIII.3-5

Supplementary Meteorological Data

Table 1 lists the dates and hours of the "worst-case" 3-hour and 24 hour periods for any point, for the Deep Creek Mountains potential Class I region and for the City of Tooele. The hourly meteorological inputs for these periods are listed in chronological order in Table 2 through 7.

TABLE 1

Dates and Hours of "Worst-Case" 3-Hour and 24-Hour Periods

Area	3-Hours	24-Hours
Any Point (Vicinity of the plant)	1-2 December 1951 2200-0000	22-23 June 1950 2200-2100
Deep Creek Mountains	13 November 1954 0200-0400	1-2 November 1953 0900-0800
City of Tooele	31 October 1952 0800-1000	30-31 October 1950 0700-0600

APPENDIX VIII.3-5 (continued)

TABLE 2

Hourly Meteorological Inputs for the Period 2200 MST on 22 June 1950 to 2100 MST on 23 June 1950

Hour (MST)	Wind Direction (deg)	Wind Speed (m/sec)	Mixing Depth (m)	Ambient Air Temperature (°K)	Potential Temperature Gradient (°K/m)	Wind-Profile Exponent	Vertical Turbulent Intensity (rad)	Lateral Turbulent Intensity (rad)
2200	203	11.84	2400	296	0.000	0.10	0.0465	0.1111
2300	203	11.33	2400	295	0.000	0.10	0.0465	0.1111
2400	203	9.78	2250	295	0.000	0.10	0.0465	0.1111
0100	203	6.18	1950	294	0.000	0.10	0.0465	0.1111
0200	203	8.75	2250	294	0.000	0.10	0.0456	0.1111
0300	203	14.41	2400	294	0.000	0.10	0.0465	0.1111
0400	203	11.84	2400	293	0.000	0.10	0.0465	0.1111
0500	203	12.36	2400	293	0.000	0.10	0.0465	0.1111
0600	203	13.38	2400	293	0.000	0.10	0.0465	0.1111
0700	203	15.44	2400	295	0.000	0.10	0.0465	0.1111
0800	203	14.93	2400	296	0.000	0.10	0.0465	0.1111
0900	203	14.41	2400	299	0.000	0.10	0.0465	0.1111
1000	203	15.44	2400	299	0.000	0.10	0.0465	0.1111
1100	203	14.93	4000	300	0.000	0.10	0.0735	0.1310
1200	203	16.47	4000	301	0.000	0.10	0.0735	0.1310
1300	203	16.99	4000	302	0.000	0.10	0.0735	0.1310
1400	225	14.93	4000	303	0.000	0.10	0.0465	0.1009
1500	225	12.36	2400	303	0.000	0.10	0.0465	0.1009
1600	225	12.36	2400	303	0.000	0.10	0.0465	0.1009
1700	203	13.38	2400	302	0.000	0.10	0.0465	0.1009
1800	203	15.96	2400	301	0.000	0.10	0.0465	0.1009
1900	203	15.44	2400	299	0.000	0.10	0.0465	0.1009
2000	203	10.81	2250	296	0.000	0.10	0.0465	0.1009
2100	180	8.24	1950	295	0.000	0.10	0.0465	0.1009

Source: Bowers, et. al., 1978a.

APPENDIX VIII.3-5 (continued)

TABLE 3

Hourly Meteorological Inputs for the Period 0700 MST on 30 October 1950 to 0600 MST on 31 October 1950

Hour (MST)	Wind Direction (deg)	Wind Speed (m/sec)	Mixing Depth (m)	Ambient Air Temperature (°K)	Potential Temperature Gradient (°K/m)	Wind-Profile Exponent	Vertical Turbulent Intensity (rad)	Lateral Turbulent Intensity (rad)
0700	139	4.6	860	287	0.005	0.15	0.0465	0.0665
0800	180	1.0	800	288	0.000	0.20	0.0735	0.1051
0900	193	4.6	1600	291	0.000	0.10	0.0735	0.1051
1000	193	8.2	1125	293	0.000	0.10	0.0465	0.1223
1100	193	12.4	1625	295	0.000	0.10	0.0465	0.1223
1200	193	14.4	1625	296	0.000	0.10	0.0465	0.1223
1300	193	11.8	1625	297	0.000	0.10	0.0465	0.1223
1400	193	13.4	1625	297	0.000	0.10	0.0465	0.1223
1500	193	14.4	1625	297	0.000	0.10	0.0465	0.1223
1600	193	14.4	1625	295	0.000	0.10	0.0465	0.1223
1700	193	11.3	1625	293	0.000	0.10	0.0465	0.1223
1800	193	11.3	1625	292	0.000	0.10	0.0465	0.1223
1900	193	9.3	1275	291	0.000	0.10	0.0465	0.1223
2000	193	5.7	1125	290	0.000	0.10	0.0465	0.1223
2100	193	5.7	1125	288	0.000	0.10	0.0465	0.1223
2200	193	5.7	1125	288	0.000	0.10	0.0465	0.1223
2300	193	7.7	1125	288	0.000	0.10	0.0465	0.1223
0000	193	7.2	1125	288	0.000	0.10	0.0465	0.1223
0100	193	8.2	1125	288	0.000	0.10	0.0465	0.1223
0200	193	7.7	1125	287	0.000	0.10	0.0465	0.1223
0300	193	9.3	1275	288	0.000	0.10	0.0465	0.1223
0400	193	7.2	1125	286	0.000	0.10	0.0465	0.1223
0500	193	6.7	1125	285	0.000	0.10	0.0465	0.1223
0600	193	8.2	1125	286	0.000	0.10	0.0465	0.1223

Source: Bower, et al., 1978a.

APPENDIX VIII.3-5 (continued

TABLE 4

Hourly Meteorological Inputs for the Period 2200 MST on 1 December 1951 to 0000 MST on 20 December 1951

Hour (MST)	Wind Direction (deg)	Wind Speed (m/sec)	Mixing Depth (m)	Ambient Air Temperature (°K)	Potential Temperature Gradient (°K/m)	Wind-Profile Exponent	Vertical Turbulent Intensity (rad)	Lateral Turbulent Intensity (rad)
2200	203	4.12	460	277	0.005	0.15	0.0465	0.0829
2300	203	4.12	460	279	0.005	0.15	0.0465	0.0829
0000	203	4.63	460	277	0.005	0.15	0.0465	0.0829

Source: Bowers, et al., 1978a.

TABLE 5

Hourly Meteorological Inputs for the Period 0800 to 1000 MST on 31 October 1952

Hour (MST)	Wind Direction (deg)	Wind Speed (m/sec)	Mixing Depth (m)	Ambient Air Temperature (°K)	Potential Temperature Gradient (°K/m)	Wind-Profile Exponent	Vertical Turbulent Intensity (rad)	Lateral Turbulent Intensity (rad)
0800	193	3.1	860	279	0.005	0.15	0.0465	0.0829
0900	193	5.1	860	284	0.005	0.15	0.0465	0.0829
1000	193	5.1	860	290	0.005	0.15	0.0465	0.0829

Source: Bower, et al., 1978a.

APPENDIX VIII.3-5 (continued

TABLE 6

Hourly Meteorological Inputs for the Period 0900 to 0800 MST
on 1-2 November 1953

Hour (MST)	Wind Direction (deg)	Wind Speed (m/sec)	Mixing Depth (m)	Ambient Air Temperature (°K)	Potential Temperature Gradient (°K/m)	Wind-Profile Exponent	Vertical Turbulent Intensity (rad)	Lateral Turbulent Intensity (rad)
0900	124	3.1	860	280	0.005	0.15	0.0465	0.0829
1000	124	2.1	690	283	0.010	0.20	0.0465	0.0829
1100	124	2.6	690	286	0.010	0.20	0.0465	0.0829
1200	124	4.1	1600	288	0.000	0.10	0.0735	0.1051
1300	180	3.6	1600	289.	0.000	0.10	0.0735	0.1051
1400	202	5.1	860	291	0.005	0.15	0.0465	0.0665
1500	225	3.1	690	292	0.005	0.15	0.0465	0.0665
1600	Calm		800	291	0.000	0.20	0.0735	0.1051
1700	Calm		125	288	0.040	0.30	0.0235	0.0336
1800	180	3.6	860	286	0.005	0.15	0.0465	0.0665
1900	180	3.6	125	284	0.010	0.20	0.0350	0.0501
2000	157	3.6	125	285	0.010	0.20	0.0350	0.0501
2100	180	3.1	125	285	0.010	0.20	0.0350	0.0531
2200	180	2.6	125	283	0.020	0.25	0.0350	0.0531
2300	180	3.1	125	284	0.010	0.20	0.0350	0.0531
0000	124	3.6	860	284	0.005	0.15	0.0465	0.0665
0100	157	4.1	860	285	0.005	0.15	0.0465	0.0665
0200	124	4.6	860	285	0.005	0.15	0.0465	0.0665
0300	157	3.6	860	285	0.005	0.15	0.0465	0.0665
0400	124	2.6	125	284	0.020	0.25	0.0350	0.0501
0500	157	2.6	125	284	0.020	0.25	0.0350	0.0501
0600	124	3.6	860	284	0.005	0.15	0.0465	0.0665
0700	157	2.6	125	284	0.020	0.25	0.0350	0.0501
0800	180	3.6	860	288	0.005	0.15	0.0465	0.0665

Source: Bower, et al., 1978a.

TABLE 7

Hourly Meteorological Inputs for the Period 0200 to 0400 MST
on 13 November 1954

Hour (MST)	Wind Direction (deg)	Wind Speed (m/sec)	Mixing Depth (m)	Ambient Air Temperature (°K)	Potential Temperature Gradient (°K/m)	Wind-Profile Exponent	Vertical Turbulent Intensity (rad)	Lateral Turbulent Intensity (rad)
0200	124	3.6	860	277	0.005	0.15	0.0465	0.0829
0300	124	2.1	690	276	0.010	0.20	0.0465	0.0829
0400	124	1.5	460	276	0.020	0.25	0.0465	0.0829

Source: Bower, et al., 1978a.

APPENDIX VIII.3-6

Coal Trace Element Analysis

Trace Element	Range p/m
Antimony	0.0 to 0.5
Arsenic	0.2 to 3.0
Barium	6.0 to 130.0
Beryllium	0.3 to 6.0
Boron	38.0 to 190.0
Bromine	0.0 to 2.0
Cerium	5.0 to 32.0
Cesium	0.1 to 10.0
Chromium	8.0 to 26.0
Cobalt	2.0 to 14.0
Copper	7.0 to 15.0
Europium	0.0 to 0.6
Fluorine	23.0 to 570.0
Gadolinium	0.0 to 0.5
Gallium	2.0 to 18.0
Germanium	0.0 to 3.0
Lanthanium	4.0 to 39.0
Lead	1.0 to 7.0
Lithium	2.0 to 180.0
Manganese	5.0 to 64.0
Mercury	0.03 to 0.21
Molybdenum	8.0 to 28.0
Neodymium	0.4 to 2.0
Nickel	2.0 to 20.0
Niobium	0.9 to 6.0
Praesdymium	0.2 to 3.0
Rubidium	0.2 to 9.0
Samarium	0.0 to 0.9
Scandium	4.0 to 26.0
Selenium	0.0 to 1.0
Strontium	21.0 to 320.0
Thorium	0.0 to 7.0
Tin	0.0 to 2.0
Tungsten	0.0 to 2.0
Uranium	0.0 to 9.0
Vandium	4.0 to 24.0
Yttrium	4.0 to 37.0
Zinc	4.0 to 44.0
Zirconium	11.0 to 57.0

The following trace elements and their concentrations were found to be less than 0.3 p/m:

Bismuth	Holmium	Palladium	Tantalium
Cadmium	Iodine	Platinium	Terbium
Dysprosium	Iridium	Phenium	Telluvium
Erbium	Lutecium	Phodium	Thallium
Gold	Osmium	Silver	Yherbium
Hafnium			

Source: IPP, 1978.

GLOSSARY

Acre-Foot. The volume of water required to cover 1 acre to a depth of 1 foot-43,560 cubic feet.

Air Quality Control Region. A region established to assist state air quality agencies in the abatement, prevention, and control of air pollution.

Animal Unit Month. The amount of natural or cultivated feed necessary for the sustenance of one cow or its equivalent, for a period of one month.

Appropriate Federal Official. A federal official having responsibility and authority to implement decisions.

Aquifer. A subsurface zone that yields economically important water to wells.

Average Daily Traffic. The average number of vehicles passing a given point in a day.

Base Flow. The flow of water entering stream channels from ground water sources.

Base Load. The minimum load upon a power generator over a given period of time.

Bipolar. Having two poles--in this statement a positive (+) and negative (-).

Borrow Material. Material (sand, gravel, etc.) excavated in order to provide fill elsewhere.

Braided Stream. A stream flowing in several channels which divide and reunite.

Circuit Miles. The length, in miles, in an electrical circuit.

Co-generation. The use of a gas turbine to turn electrical generators and concurrently using waste heat to produce steam which drives a second generator.

Cold Desert. An area of low precipitation extending north from southern Nevada and Utah--the Great Basin Desert. Daytime temperatures may be high, but frosts may occur in any month and are commonplace in autumn, winter, and spring.

Cold Standby. A condition in which a generating station is available for service, but with boilers unfired.

Combined Cycle Combustion Turbine. The use of a gas turbine to drive a generator and, concurrently, using the waste heat to produce steam, which drives another generator.

Converter Station. A station which converts alternating current to direct current--or the converse.

Critical Habitat. Habitat essential to the survival of wild population of an endangered or threatened species.

Crucial Deer Winter Range. That portion of a deer population's range to which they are limited during a severe winter.

Double Circuiting. A system of placing two electrical circuits on a single set of towers.

Electrostatic Precipitator. A means of removing particulates from gases. Particles are given an electrical charge and attracted to a plate with an opposite charge.

Endangered Species. The Endangered Species Act of 1973 defines an endangered species as "any species which is in danger of extinction throughout all or a significant portion of its range . . ."

Endemic Species. Species which are peculiar to a particular locality.

Ephemeral Surface Water. Surface water directly resulting from rainfall or snowmelt.

Hot Desert. An area of low precipitation and generally high temperatures and which includes the Mohave, Sonoran, and Chihuahuan deserts.

Inversion. A condition in which air temperature increases with height above ground.

Load Factor. The amount of a generating system's power capacity being used.

Microwave Communication. Transmission of Messages using highly directional microwave beams.

Mixing Height. The height at which relatively vigorous mixing takes place between air layers.

New Source Performance Standards. A set of standards which limit the quantities of pollutants released into the atmosphere from plant stacks.

Nonspecular Conductors. Electrical conductors which are dull and hence do not shine.

Pasquill Stability Categories. A classification system, based upon wind persistence, which describes pollution dispersion.

Peak Load. The maximum load placed upon an electrical generating system.

Photochemical Oxidants. Chemicals which result from oxidation caused by exposure to sunlight.

Phreatophytes. Plants which derive water from the water table.

Pibals. Pilot ballons.

Prevention of Significant Deterioration Regulations. Regulations intended to protect uniquely clean air quality by not allowing further significant degradation. Areas may be designated Class I, II, III.

Primary National Ambient Air Quality Standards. Air quality standards established for the protection of human health.

Project Life. The life-span of a project determined by factors such as economics, equipment design, raw material availability, etc. For IPP, the project life is 35 years.

Public Lands. Unless otherwise qualified, lands administered by the Bureau of Land Management.

Right-of-Way. A right granted to cross or occupy, but without transfer of ownership.

Roadless Area. When capitalized, an inventories area generally 5,000 acres or larger which is currently being protected to maintain its wilderness character until a Land Management Plan for the area either recommends it become a Wilderness Study area or returns it to management for other resources. When not capitalized, roadless area refers to an unroaded area.

Secondary National Ambient Air Quality Standards. Air quality standards established to protect public welfare, and the prevention of damage to animals, vegetation, and property.

Secondary Pollutants. New pollutants formed during the transport of emissions from a source.

Strutting Ground. The area used by sage grouse for their courtship display.

Threatened Species. The Endangered Species Act of 1973 defines threatened species as "any species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range."

Trace Elements. A chemical element found in small quantities (less than 1.0 percent) in a mineral.

Wild Trout Fishery. A fishery which sustains itself through natural reproduction.

Wilderness Candidate Study Area or Wilderness Study Area. An area designated by the U.S. Forest Service for apparent potential for possible inclusion in the National Wilderness Preservation System.

Wind Rose. A graphic presentation of wind persistence and direction.

LIST OF ABBREVIATIONS

GENERAL ABBREVIATIONS

a.c.	-	alternating current
BLM	-	Bureau of Land Management
BOR	-	Bureau of Outdoor Recreation
ca.	-	*Circa* (about)
CFR	-	Code of Federal Regulations
CO	-	carbon monoxide
CRES	-	Cultural Resource Evaluation System
d.c.	-	direct current
DES	-	Draft Environmental Statement
D.O.	-	District Office (Bureau of Land Management)
DRI	-	Desert Research Institute
EAR	-	Environmental Analysis Report
EPA	-	Environmental Protection Agency
ERDA	-	Energy Research and Development Administration
ERT	-	Environmental Research and Technology
ES	-	Environmental Statement
FAA	-	Federal Aviation Administration
FES	-	Final Environmental Statement
HC	-	hydrocarbons
I-	-	Interstate- (interstate highway designation, e.g. I-70)
ICPA	-	Intermountain Consumers Power Association
IPP	-	Intermountain Power Project

LIST OF ABBREVIATIONS

(continued)

MFP	-	Management Framework Plan
MISTT	-	Midwest Interstate Sulfur Transport and Transformation
m.s.l.	-	mean sea level
NAAQS	-	National Ambient Air Quality Standards
NEPA	-	National Environmental Policy Act
N.F.	-	National Forest
NOAA	-	National Oceanic and Atmospheric Administration
NOx	-	oxides of nitrogen
NO_2	-	nitrogen dioxide
NSPS	-	New Source Performance Standard
O_3	-	ozone
ORV	-	off road vehicles
P.L.	-	Public Law
PSDR	-	Prevention of Significant Deterioration Regulation
PU	-	planning unit
ROW	-	right-of-way
SHPO	-	State Historic Preservation Officer
SOx	-	oxides of sulfur
SO_2	-	sulfur dioxide
spp.	-	species
TSP	-	total suspended particulates
U-	-	Utah- (highway designation, e.g. "U-24")
UDWR	-	Utah Department of Wildlife Resources

LIST OF ABBREVIATIONS

(continued)

UP&L	-	Utah Power and Light Company
URA	-	unit resource analysis
USDI	-	United States Department of Interior
USFS	-	United States Forest Service
USGS	-	United States Geological Survey
var.	-	variety
WCWCD	-	Wayne County Water Conservancy District
WESD	-	Westinghouse Environmental Systems Department

UNITS OF MEASURE

AUM	-	animal unit month
Btu	-	British thermal unit
Btu/hr	-	British thermal unit per hour
Btu/lb	-	British thermal unit per pound
Btu/ton	-	British thermal unit per ton
C	-	Celsius
cu. yds.	-	cubic yards
F	-	Fahrenheit
ft.	-	feet
ft^3	-	cubic feet
ft^3/s	-	cubic feet per second
gal/day	-	gallons per day
Gwh	-	gigawatt hours (1 billion watt hours)

UNITS OF MEASURE

(continued)

hr	-	hour
kV	-	kilovolt (one thousand volts)
lb	-	pound
lb/acre	-	pounds per acre
lb/in^2	-	pounds per square inch
lb/million	-	pounds per million
m	-	meters
$\mu g/m^3$	-	microgram per cubic meter
mg/ℓ	-	milligrams per liter
mi	-	miles
m/sec	-	meters per second
MW	-	megawatts (one million watts)
p/m	-	parts per million
tons/day	-	tons per day
$tons/mi^2/month$	-	tons per square mile per month
$tons/mi^2/year$	-	tons per square mile per year
yds	-	yards

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